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TRANSACTIONS & STUDIES
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Volume 31
(Fourth Series)

Number 1
(July 1963)

Antibiotics—Singly or in Combination?[1]

By HARRY F. DOWLING, M.D.[2]

TONIGHT is an occasion to discuss two different combinations: combinations of antibiotics, which I shall speak about presently, and also the combination of a command, a privilege, and an opportunity. Dr. Isaac Starr, before he retired as Chairman of the Council on Drugs of the American Medical Association, asked me, as a member of the Council who was familiar with antibiotics, to give this lecture. Coming as it did from one of the most respected men in American medicine, I considered this a command which I was most happy to obey. Second, it is a privilege to speak before this renowned College in the company of so many distinguished Hatfield lecturers. And finally, this lecture presents an opportunity; because it is named for a physician who was not only a busy and successful private practitioner but who also worked for the greater good of this city and this state, it gives me the opportunity to discuss the practical use of combinations of antibiotics and also the socioeconomic forces that have affected their use. As the great historian of science, George Sarton, said (1), "It is not enough to appreciate and admire what our ancestors did, we must take up their best traditions."

To this end, let us compare the therapeutics of a hundred years ago, which was the midpoint of Dr. Hatfield's membership in this College, with the therapeutics of today. Up to the time of Dr. Hatfield's graduation from medical school in 1826, the research that had revolutionized physics and chemistry in the preceding centuries had affected clinical medicine little if at all. Although the second and third quarters of the nineteenth century saw the introduction of improved methods of research into clinical medicine, this research involved the basic study of disease only. According to Shryock (2), "Research men were so preoccupied with this 'pure' research, which had no immediate prospect of utility, that they apparently lost interest in therapy."

In consequence, the practice of medicine was still guided by theories which were pure speculation and which we now consider to be absurd. Meanwhile, the desire to do something for patients with infectious diseases forced the doctor to use a multitude of so-called cures—some harmless, some dangerous, all worthless, except the bark of the cinchona tree—and even this was thought to cure every type of fever. Prescriptions included several, often a dozen, ingredients. Worst of all, this polypharmacal tragicomedy continued to be

[1] Nathan Lewis Hatfield Lecture XLVII, The College of Physicians of Philadelphia, 2 January 1963.

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played over and over because its critics were impotent; they were impotent because diseases were poorly defined and controlled clinical experiments were unheard of.

In the last quarter of the nineteenth century, the research laboratories brought forth their first fruits: antipyrine synthesized from coal tar appeared in 1884, acetanilide in 1886 and aspirin in 1899. Pasteur gave rabies vaccine to Joseph Meister in 1885; diphtheria antitoxin was first used in humans in 1894. Other drugs and biologicals followed, at first in a trickle, then in a swift-moving stream and lately in a cascade, so that in the year 1960 over three hundred new drugs were introduced (3).

Today, in contrast to Dr. Hatfield's day, research is no longer divorced from therapeutics; much of it is aimed directly at the discovery of new drugs. What is more, many of the drugs act specifically to cure particular diseases or to improve altered physiologic states. As a result, most prescriptions consist of a single drug, because the inactive ingredients have been stripped away. And, one final difference between 1862 and 1962—the introduction of scientific methods into clinical medicine and the availability of potent drugs paved the way for careful clinical trials by which the useless drugs can be eliminated. The large store of clinical knowledge about the infectious diseases can now be used to determine the value of a new drug when it appears. The natural course of each disease can be compared with the course of the disease in the treated patient and, where there is doubt, a controlled experiment can be done. Not only can drugs be made by scientific methods and tested in the laboratory by scientific methods, but they can be given the ultimate test, the trial in patients, by the same scientific methods. Let us now see how well this system has been applied to the use of combinations of antibiotics.

As soon as the second antibiotic followed the first and the third and the fourth came crowding after, it occurred to clinicians that, if one antibiotic worked well, two might be better. At first these trials were isolated and haphazard, and we learned little from them. At the same time, laboratory investigators began to combine antibiotics in the test tube and on the agar plate. But the first comprehensive studies which joined ward and laboratory were those on enterococcal endocarditis. Hunter (4) was dissatisfied with the meager success he was obtaining with penicillin or streptomycin in enterococcic endocarditis. He treated one patient successfully with the two drugs in combination (5), but he did not realize the significance of this at the time and turned to the laboratory for help instead. Here he found that penicillin and streptomycin were synergistic *in vitro*, i.e., that the combination killed enterococci while either drug alone merely suppressed growth. Subsequent studies in patients and in the laboratory (6, 7) verified these observations. But the correlation of results from laboratory and clinic is not complete, as shown by Tompsett and Pizette's (8) observations on four patients with enterococcal endocarditis. The enterococci isolated from two of these patients were successfully killed *in vitro* by the combination of penicillin and streptomycin, whereas the strains from the other two patients were not; yet all four patients responded equally well to penicillin-streptomycin therapy with these two antibiotics. Thus, as a final test, careful clinical observations were decisive; the fact that penicillin and streptomycin are superior to penicillin alone in enterococcic endocarditis is secure on clinical evidence only.

The clinical observations on enterococcal endocarditis led to other important observations in the laboratory. Jawetz (9) had been troubled by the fact that the usual test of the sensitivity of bacteria to antibiotics that measures the suppression of bacteria (such as the commonly-used disc test) did not predict the clinical results obtained in enterococcal infections. Therefore, he carried out extensive studies on the bactericidal effect of single antibiotics and combinations. In these studies *in vitro* and in animals, Jawetz and his associates (10–15) demonstrated that, when

certain antibiotics were combined they produced better results than one antibiotic alone; other combinations produced worse results than one antibiotic alone; still other combinations were no more effective than an equal amount of the more effective drug. Thus, they demonstrated synergism, antagonism, or indifference between two antibiotics used in combination.

Jawetz (16) applied these laboratory investigations to the treatment of patients with serious infections caused by antibiotic-resistant staphylococci. He grew each patient's strain of staphylococcus in mixtures of antibiotics, using the concentration of each antibiotic that would be found in the blood of a patient treated with optimal doses. That mixture of two or more antibiotics which brought about complete killing of the staphylococcus in the shortest period of time was selected for therapy. All 11 patients with serious staphylococcic infections treated in this manner recovered. Since single antibiotics had already been unsuccessful in the treatment of these patients, and since the staphylococci were not killed *in vitro* by any individual antibiotic, Jawetz' results show that combined therapy can be used successfully in selected cases if they are first studied in the laboratory by methods that measure the killing of bacteria rather than mere inhibition of growth.

Yet the path from the laboratory to the patient is not always dependable. For instance, Heilman (17) found that Brucella infections in mice were controlled better by a combination of chlortetracycline and dihydrostreptomycin than by either antibiotic alone. These findings appeared to be verified in patients with brucellosis when Herrell and Barber (18) and Magill and Killough (19) observed a low relapse rate in patients who had received the combination of a tetracycline and a streptomycin. But in neither series were patients who had received the combination compared with patients who had been given only tetracycline. When other investigators (20–22) made this comparison they found that the relapse rate was no higher when a tetracycline was used alone than when it was given in combination with streptomycin or dihydrostreptomycin. Thus, in brucellosis, clinical studies with combinations of antibiotics failed to verify laboratory experiments; and, since the ultimate criterion is clinical effectiveness, tetracycline is now being used without streptomycin in this disease.

Another observation by Lepper and Dowling (23) was the first clinical evidence of antagonism between two antibiotics administered concurrently. When penicillin and chlortetracycline were administered together in pneumococcic meningitis, 79 per cent of patients died, while only 30 per cent of patients died who received penicillin alone in the same doses. The antagonism of the tetracyclines against penicillin in this disease has since been confirmed by Olsen and associates (24) and by Appelbaum (25).

Our group (26, 27) followed these clinical observations with studies on mice treated with penicillin, chlortetracycline or the two together. These experiments showed that the ratio of the amounts of penicillin and chlortetracycline administered determined whether antagonism between the two antibiotics would occur, or whether they would have an additive effect upon one another or whether the results of the combination would be the same as when one of the antibiotics was given alone. This then was an example of the antagonistic action of two antibiotics, observed first in the clinic and verified in the laboratory.

The foregoing have been chosen as illustrations of the evolution of knowledge about certain combinations of antibiotics. Since time does not permit a discussion of each combination, I will try to complete the picture by giving my recommendations for the use of combinations of antibiotics based on the studies in our clinic and the studies of many other investigators. These are shown in Table 1. In certain infections, two antibiotics produce better results than any feasible dose of either antibiotic alone. I believe that all investigators would agree that the combination of penicillin and streptomycin is superior to peni-

TABLE 1
RECOMMENDATIONS FOR THE USE OF ANTIBIOTICS IN COMBINATION

Purpose	Antibiotics	Indications for Use
To achieve a better result than can be obtained with either antibiotic alone (synergism)	Penicillin plus streptomycin	Endocarditis caused by Enterococci Other penicillin-resistant streptococci Penicillin-susceptible streptococci
	Penicillin plus a tetracycline or chloramphenicol, as determined in vitro.	Infections caused by resistant staphylococci
	Other combinations of antibiotics, as determined in vitro.	Infections caused by Staphylococci Gram-negative rods
To prevent the emergence of resistant microorganisms	Isoniazid plus streptomycin or para-aminosalicylic acid.	Tuberculosis
	Tetracycline plus nystatin or amphotericin.	Where tetracycline is indicated.

cillin alone in the treatment of enterococcic endocarditis. In fact, large doses of penicillin alone will rarely bring about recovery whereas about two-thirds of the patients recover on doses of 20 million units of penicillin a day for six weeks, plus streptomycin 2 grams a day for three weeks, followed by 1 gram for the remaining three weeks.

Endocarditis caused by alpha and gamma streptococci that are resistant to penicillin should be treated in the same manner as enterococcal endocarditis. Although good results can be obtained with penicillin alone when the streptococci of endocarditis are sensitive to penicillin, only about 75 per cent of patients recover from the infection without relapse. On the other hand, Hunter (28) has shown that 90 to 95 per cent of patients will recover without relapse when a combination of 2 million units of penicillin a day is administered for two weeks along with two grams of streptomycin a day for the first week and one gram a day for the second week. The endocarditides caused by streptococci are the only infections in which therapy with combinations of antibiotics can be considered synergistic without previous *in vitro* test of the combination against the causative organism.

Before the advent of methicillin and oxacillin, infections with penicillin-resistant staphylococci presented the most difficult problem in antibiotic therapy. In attempting to treat patients with these infections several investigators (29–32) found that an *in vitro* combination of penicillin and a tetracycline or chloramphenicol would inhibit growth of the staphylococcus *in vitro* and that the combination was successful in curing a few patients. In our clinic, we are also applying the method of the *in vitro* testing of the bactericidal power of combinations of antibiotics to the treatment of bacteremias caused by gram-negative rods, but it is too early to tell whether a correlation exists between *in vitro* and clinical results in this area. On the basis of present knowledge, however, I would recommend that in any

serious infection with a microorganism that has not been shown by experience to be amenable to therapy with one or several antibiotics, *in vitro* tests with suitable antibiotics should be done, singly and in combination, by a method that will determine bactericidal power (and not merely bacteriostasis as in the usual disc test). If *in vitro* tests do not show that a single antibiotic is bactericidal in concentrations obtainable in the blood with optimal doses of the antibiotic, the combination that produces complete killing within the shortest period of time should be tried in the treatment of the patient.

The second reason for using combinations of antibiotics is to slow the emergence of resistant microorganisms so that therapy may be completed before they appear. Careful clinical trials (33) have shown that for this reason, therapy with isoniazid alone in the treatment of chronic tuberculosis is not so successful as when isoniazid is combined with streptomycin or aminosalicylic acid. There is also some evidence that when a tetracycline is combined with an antifungal agent such as nystatin or amphotericin, superinfections with fungi may occur less frequently than when the tetracycline is used alone. Although definite proof of this is lacking, this combination may be used if desired.

One word of caution about combinations of antibiotics should be added. Sometimes a clinician will consider it necessary to start therapy with a combination of antibiotics before the results of the *in vitro* tests are available. If he does this, he should be mindful that certain combinations of antibiotics have been shown to be antagonistic *in vitro* and, as stated before, there is some clinical confirmation of this. Consequently, if therapy with a combination must be started before the results of *in vitro* tests are known, certain combinations should be avoided. Jawetz (34) originally postulated that primarily bactericidal drugs such as penicillin, streptomycin, bacitracin and neomycin could be used in combination without antagonistic effects and that primarily bacteriostatic drugs such as chloramphenicol, the tetracyclines, erythromycin and oleandomycin would never be synergistic but would not be antagonistic either. He believed that the combination of a bacteriostatic with a bactericidal drug was to be avoided since these antibiotics might sometimes be synergistic but also sometimes antagonistic. Manten and Wisse (35) have introduced a more complicated formulation which includes the more recently introduced antibiotics. Their schema is shown in simplified form in Figure 1. It will be seen that antibiotics in the bacteriostatic group, chloramphenicol, erythromycin, oleandomycin and the tetracyclines, are antagonistic to certain bactericidal antibiotics, penicillin, novobiocin, ristocetin and vancomycin, but not to other bacteriocidal antibiotics, bacitracin, neomycin, polymyxin, colistin and streptomycin. Antagonism does not occur between members of the bacteriostatic group nor between members of the two bactericidal groups. Bacteriostatic antibiotics are never synergistic when combined; their effects are merely additive in the same way as when the dose of either antibiotic alone is doubled. Bactericidal antibiotics may be synergistic when combined.

It must be remembered, however, that these recommendations are based mostly on *in vitro* observations; only some of the combinations have been given adequate clinical testing. Thus, combination therapy should be avoided if possible when *in vitro* testing has not been done, except in the infections shown in Table 1.

Having summarized the recommendations for the therapy of infections with antibiotics, I should like to turn to the effect of other forces upon the use of these combinations. So far, I have discussed how scientific curiosity combined with intelligent observations in the laboratory and the clinic has added to our knowledge of combinations of antibiotics and how they can be depended upon to keep our therapy up to the highest mark. But forces other than scientific curiosity and intelligent observation shape the doctor's conduct. The desire of some manufacturers for quick profits, the desire of some doctors for publicity—

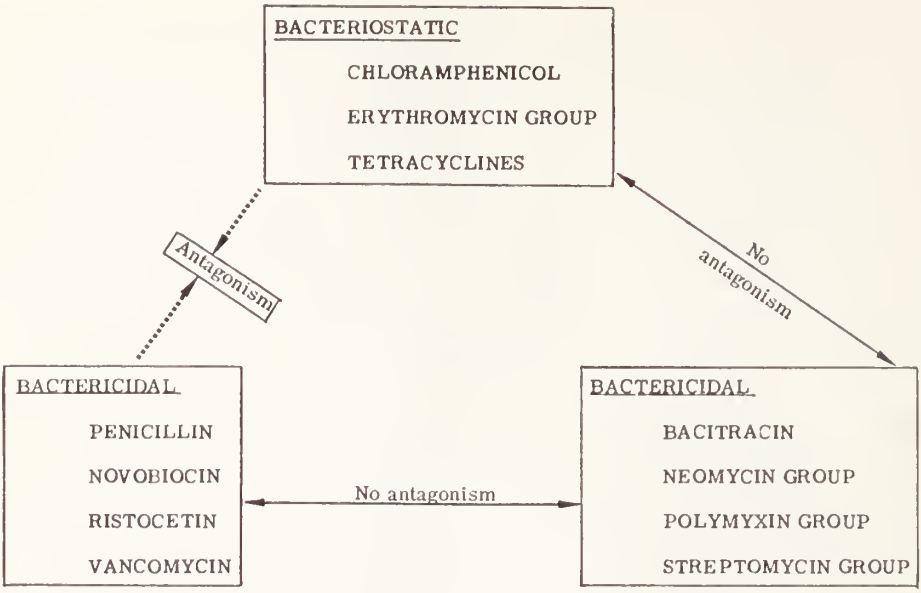

FIGURE 1

these may make a travesty of testing and offer to the practicing physician the hocus-pocus of the medicine show rather than the sharing of truth between scientist and brother scientist.

Let me cite an example of what I consider to be the failure of the clinic and laboratory to collaborate in a sound study. English and his coworkers (36) reported that 28 strains of *Staphylococcus aureus* were inhibited by a smaller amount of a combination of two-thirds tetracycline and one-third oleandomycin than of either antibiotic alone. (This combination was later marketed under the proprietary name Sigmamycin and then Signemycin.) When this report is examined, it is evident that the two antibiotics combined were definitely superior to one of the antibiotics in inhibiting growth of only 7 of the 28 isolates of staphylococcus reported by these investigators. Nevertheless, this was heralded as evidence that a new era had come to the antibiotic field, the era of combination therapy (37), ushered in by the combination of oleandomycin and tetracycline. What English and his associates had failed to state, however, was the total number of strains examined and how many of them were adversely affected by the combination as compared with either antibiotic alone. In subsequent studies by other investigators (38–40), this combination showed *in vitro* synergistic action against only a small percentage of strains of *Staphylococcus aureus*. On the other hand, the mixture was antagonistic when other strains were tested, i.e., it produced poorer results than one of the antibiotics acting alone.

Meanwhile, this tetracycline-oleandomycin combination had been used by a number of clinicians. When the reports of these studies are analyzed, it is obvious that many of the patients treated had had illnesses which were self-limited, so that they would have improved without therapy. Many of the illnesses appeared to have been viral in origin, and thus called for no specific therapy at all. In the other cases the therapeutic results were compatible with the individual action of tetracycline or oleandomycin and could not be attributed to any synergistic action. No controlled study was made in which this combination was compared with each of the individual antibiotics in alternate patients. Nor am I aware of any study of a patient with a serious infection who was treated success-

fully with the tetracycline-oleandomycin combination, and from whom a staphylococcus was isolated which was inhibited by therapeutic concentrations of the combination and not by therapeutic concentrations of one of the antibiotics alone. In other words, no clinical studies have appeared which show the superiority of the combination over the individual antibiotics. *The ultimate test, the careful clinical test, has never been done.* Yet this mixture of antibiotics was widely advertised, is currently being actively promoted and is being prescribed by many doctors.

The demonstration that this mixture has failed to substantiate the claims made for it has required the efforts of many investigators, all of which could have been directed into more profitable channels if the original observations had been reported fully, had been interpreted more scientifically, had been verified by animal experiments, and if the first studies done in humans had been properly carried out. Dr. Eugene DuBois, in his presidential address before the Association of American Physicians in 1939 (41), likened the useless drugs that are carried along in our practice from year to year to barnacles on the bottom of a boat which impede progress and yet are hard to dislodge. As he said, "Any young neophyte can introduce a new drug. It requires a man of large experience and considerable reputation to destroy an old one." Signemycin appears to be one of these barnacles that has not yet been removed.

Fortunately, a law of physics that every action produces an equal and contrary reaction is also observed in human relationships. This time the reaction was not long in coming. Soon after Sigmamycin was highly touted, editorials (42, 43) appeared in protest against these half-tested hypotheses. Many manufacturers were reluctant to market combinations of antibiotics but might have felt compelled to do so in order to survive the sharp competition. The uprising of medical opinion against unnecessary mixtures of antibiotics probably prevented a flood of worthless mixtures. So far as I know, only one other company marketed a mixture of two antibiotics for systemic use, other than those which had been tested clinically and found valid. Most of the manufacturers sensed that the medical profession wanted only rational mixtures to use in this important area where the proper treatment might mean life rather than death for the patient. Furthermore, by pushing straight towards the development of new antibiotics, by refusing to be diverted into the promotion of questionable mixtures of known antibiotics, the pharmaceutical industry over the subsequent years has produced a number of valuable antibiotics such as kanamycin, vancomycin, ristocetin, colistin, and the penicillinase-resistant penicillins.

Philosophers dispute whether or not man is the measure of all things, but man is certainly the measure of all things scientific. Joseph Wood Krutch (44) has said, "Pure technology (that is, technology as an end in itself) is antihuman." Pure science is human because it stems from human curiosity; it frees the intellect to work where it will, but applied science must be measured by what it will do for man. It can be directed toward the betterment of man or it can pursue profit and fame while man's needs are ignored. And, to paraphrase Bronowski, when we discard the test of fact in what a drug is, we discard it in what a man is. In looking at combinations of antibiotics we have seen the contributions made by following scientific curiosity. We have seen how this curiosity can be directed so that it leads to applications in disease. We have seen that these applications have to be measured by what they will do for man. We have seen that some pass the test and are widely used, whereas others fail to pass or are poorly measured. We have seen that the combined will of doctors can enforce the results of the measurement. We have seen that such leadership is desired by the majority of pharmaceutical manufacturers and that when it is given, they will respond to it. May we learn these important lessons of history, so that we will not be condemned to repeat them.

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Effects of Aspirin and Corticosteroids on Paget's Disease of Bone[1,2]

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I. Introduction

THE BENJAMIN MUSSER Lecture for 1962 presents an opportunity to emphasize certain interesting clinical aspects of Paget's disease and to summarize the authors' investigations in this area.

II. Clinical Comments

Since Sir James Paget's first description of patients with osteitis deformans in 1876 (1), this disease has come to be recognized as a common bone disease, most often affecting middle-aged individuals and usually discovered by chance during roentgenographic examinations. In most instances the disease is asymptomatic and only slowly progressive. However, the disease may be widespread by 20 years of age and tends to be more rapidly progressive in younger patients. It may cause constant pain and produce grotesque deformities of the involved bones. In rare instances virtually every bone in the body may be affected but the mandible, ribs, and phalanges are least often involved.

Involved bones are warmer, heavier, and intensely vascularized. The histological appearance is of rapid bone resorption marked by numerous osteoclasts, adjacent areas of active osteogenesis with plump osteoblasts, trabeculae composed of numerous fragments joined by deeply staining cement lines, and a curious marrow in which fat and hematopoietic cells are replaced by numerous mesenchymal cells imbedded in an apparently fibrous stroma containing numerous blood vessels. Schmorl (2) and Reifenstein and Albright (3) observed predominant osteoclastic activity at the advancing edge of Paget's disease and Albright concluded that increased osteogenesis was secondary to such localized bone destruction.

The serum calcium and phosphorus concentrations are usually normal but may be increased or decreased. Urinary calcium excretion is similarly varied and rises sharply during periods of decreased physical activity. Serum alkaline phosphatase is increased and the increase is roughly proportional to the extent and rate of progression or activity of the disease. Calcium phosphate and calcium oxalate renal stones occur in many patients with Paget's disease and are attributable to periods of hypercalciuria.

Involvement of the skull is common (Figure 1). Due to increase in thickness of the diploë the patient notes progressive enlargement of the head. With marked involvement basilar impression (Figure 2) may exert pressure on the pons or cerebellum with resultant progressive loss of muscle strength, coordination, and central control of respiration.

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FIG. 1. Roentgenogram illustrating 'osteoporosis circumscripta' in Paget's disease. Note what appears to be a wave of bone resorption passing down from the vertex. Close inspection suggests zones of even greater (? recurrent) resorption within the obviously resorbed area and one zone which is less involved at the vertex. When only a single wave of resorption is present it produces the condition usually referred to as osteoporosis circumscripta.

FIG. 2. Roentgenogram illustrating platybasia in Paget's disease. The degree of distortion of the base of the skull may be judged by the extent to which vertebral bodies project above Chamberlain's line (shown) connecting the posterior edge of the bony palate with the posterior margin of the foramen magnum.

FIG. 3. Leontiasis ossea due to Paget's disease of the maxilla. Surgical removal of excess bone in such patients is hazardous due to the likelihood of profuse bleeding from the highly vascularized bone.

Deafness is common with involvement of the skull. It has been attributed to bony encroachment on the eighth cranial nerve as it passes through its long and narrow canal in the temporal bone but this appears unlikely since the facial nerve also occupies this canal and is rarely impaired. It should be noted that the pathological process in otosclerosis and in osteogenesis imperfecta is remarkably similar to that of Paget's disease in the temporal bone. The question is raised whether the mechanism of deafness may not be identical in the three conditions, namely, immobilization of the footplate of the stapes. We are not aware of any extensive trial of fenestration operations in either Paget's disease or osteogenesis imperfecta.

Involvement of the maxilla may produce

FIG. 4. Dental changes in Paget's disease. Note the thickening or hypercementosis of the dental roots. The alveolar process was involved with Paget's disease.

marked facial deformity and leontiasis ossea (Figure 3). With involvement of either maxilla or mandible the teeth may be secondarily involved (Figure 4). In such cases the x-ray appearance of the teeth is of blunted and expanded roots. Such "hypercementosis" cannot be differentiated from that accompanying apical infection. Histologically such teeth may present serrated zones of dental resorption as well as proliferation of the cementum. Dental involvement is always secondary to involvement of the alveolar processes.

Paget's disease may produce pain in any bone. When the pain is sharply limited in the tibia or femur careful roentgenographic examination may reveal distinctive small cortical fractures. Occasionally an entire tibia may present such cortical fractures every few centimeters (Figure 5). Persistent pain is a common early sign of sarcomatous elevation of the sensitive periosteum. It is well known that osteogenic sarcomas in adults most often arise in areas of Paget's disease and frequently are multifocal. Due to the x-ray appearance of alternating zones of bone resorption and formation in Paget's disease such sarcomata may be detected only when their size exceeds the degree of nodularity and irregularity expected of bones involved with Paget's disease (Figure 6). Most sarcomas arising in Paget's disease are fibrosarcomas; the osteogenic sarcomas are more likely to cause striking elevations in serum alkaline phosphatase.

Finally attention should be called to the relatively high frequency of occurrence of aortic stenosis in patients with Paget's disease. This is perhaps the only regular exception to the general rule that Paget's disease involves only the skeleton.

III. Current Concepts of Bone Metabolism

Before describing experimental studies it may be helpful to summarize those aspects of bone

FIG. 5. Cortical fractures of the tibia due to Paget's disease. Such cortical fractures may be exquisitely painful and difficult to demonstrate roentgenographically unless positioning and exposure factors are ideal.

FIG. 6. Sarcoma arising in an area of Paget's disease of the skull. Note the discontinuity of the outer table which is not diagnostic and the soft tissue calcification which is characteristic of osteogenic sarcoma arising in Paget's disease of the skull.

physiology useful in interpretation of the experimental results.

Bone is composed of a collagen network in which is deposited calcium phosphate in the form of hydroxyapatite crystals. Most of skeletal calcium is deeply buried in water-free apatite crystals and only 0.5% of total body calcium appears to exchange readily with isotopic calcium. The surface crystals possess hydration shells in which are found citrate and magnesium in abundance. Rapid changes in such surface crystals may temporarily alter magnesium balance. Bone collagen and ground substance are elaborated by phosphatase-rich osteoblasts in response to the stimuli of intermittent stress and strain, growth, thyroid, and sex hormones. Increased osteoblastic activity is attended by increases in serum levels of alkaline phosphatase. The factors affecting bone resorption include parathyroid hormone, pH of surrounding fluid and constant pressure. When bone is resorbed both the collagenous matrix and the calcium and phosphate ions appear to be resorbed simultaneously.

The serum level of calcium is determined primarily by parathyroid activity which in turn controls bone resorption rate. Profound alterations in rates of local or generalized bone resorption of any cause may also affect blood calcium levels. Calcium balance is determined primarily by the relative rates of bone formation and bone resorption. When one exceeds the other positive or negative balance results. Conversely, positive or negative calcium balance implies predominant bone formation or resorption.

Collagen is unique among tissues for its hydroxyproline content. Urinary hydroxyproline excretion appears related primarily to bone collagen turnover (4) and may reflect the rate of formation of soluble collagen, the rate at which soluble collagen fails to be incorporated into mature collagen, or the rate of bone collagen resorption. Since it has not been possible to date to find circumstances wherein these parameters of collagen metabolism are clearly separated the specific source of urinary hydroxyproline remains uncertain.

IV. Corticosteroid Effects in Paget's Disease

Studies by Albright and associates in 1946 and 1947 revealed that ACTH stimulated secretion of corticosteroids which in turn were responsible for increases in urinary calcium. By analogy with Cushing's syndrome Albright reasoned that the corticosteroids were anti-anabolic, inhibited bone formation, and hypercalciuria resulted from an unchanged rate of bone resorption coupled with a suppressed rate of bone formation. In 1948 and 1951, he administered ACTH to patients with Paget's disease in the expectation that the anti-anabolic effect on the bones would be

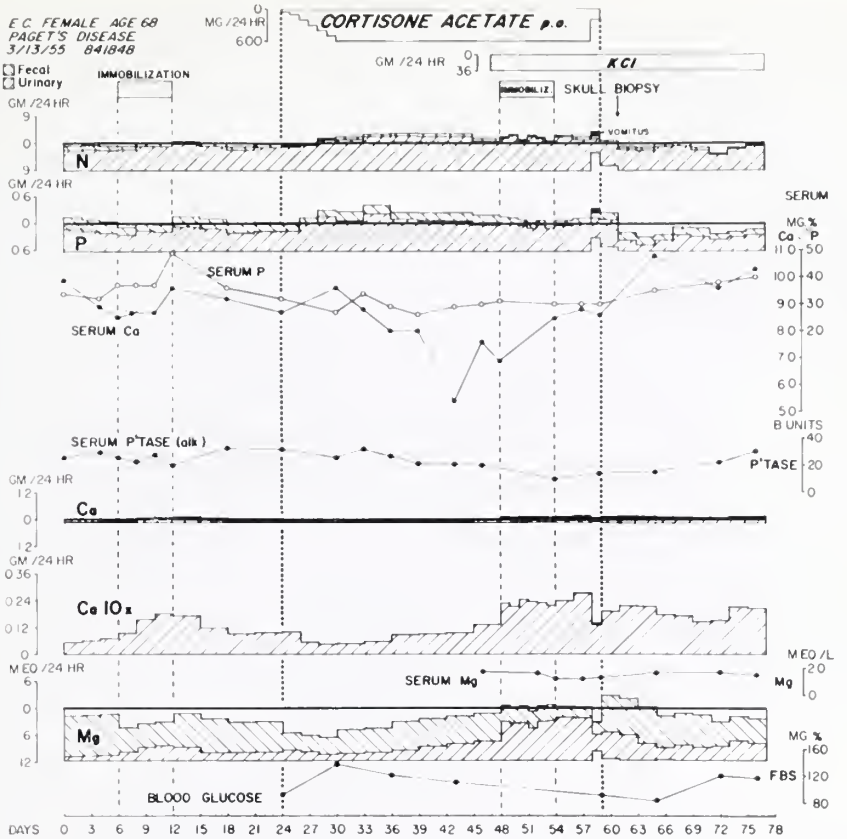

FIG. 7. Balance study illustrating effects of immobilization and of corticosteroids in Paget's disease. As with the other balance charts, there is a heavy zero line for each constituent measured. Intake is measured down from this zero line. Urinary and then fecal excretion is measured up from the intake line. Thus a clear area under the zero line represents excretion less than intake and positive balance. A hatched area above the zero line represents excretion greater than intake and negative balance. Note the hypercalciuria resulting from mild immobilization in the form of bed rest. Cortisone produced a prompt decrease in serum, urinary and fecal calcium and calcium retention and a decrease in urinary and fecal magnesium with magnesium retention. With prolonged therapy retention of both calcium and magnesium tended to wane as the serum alkaline phosphatase decreased toward normal. Note that the hypercalciuria of repeated immobilization appeared despite cortisone therapy (Cf. Figure 14).

exaggerated in patients with accelerated bone formation and absorption. To his great interest, urinary and serum calcium decreased rather than increased and serum alkaline phosphatase declined later rather than immediately. Knowledge of the therapeutic effects of ACTH and corticosteroids by the early 1950's led to the suspicion that ACTH actually had suppressed the primary destructive process in Paget's disease and additional experiments (5) were designed to test this possibility. Figure 7 illustrates the combined effects of immobilization and of cortisone in a patient with Paget's disease. As shown in figures 8 and 9 cortisone in large doses also produced striking changes in the histological appearance of Paget's disease. Osteoclasts disappeared, osteoblasts became less numerous, and the "fibrous" marrow changed in its staining characteristics, became less cellular, and began to accumulate fat and hematopoietic cells.

With the help of Dexter, Kuida and Rapaport, Albright and Henneman (6) were also able to show that the high cardiac output characteristic of widespread Paget's disease

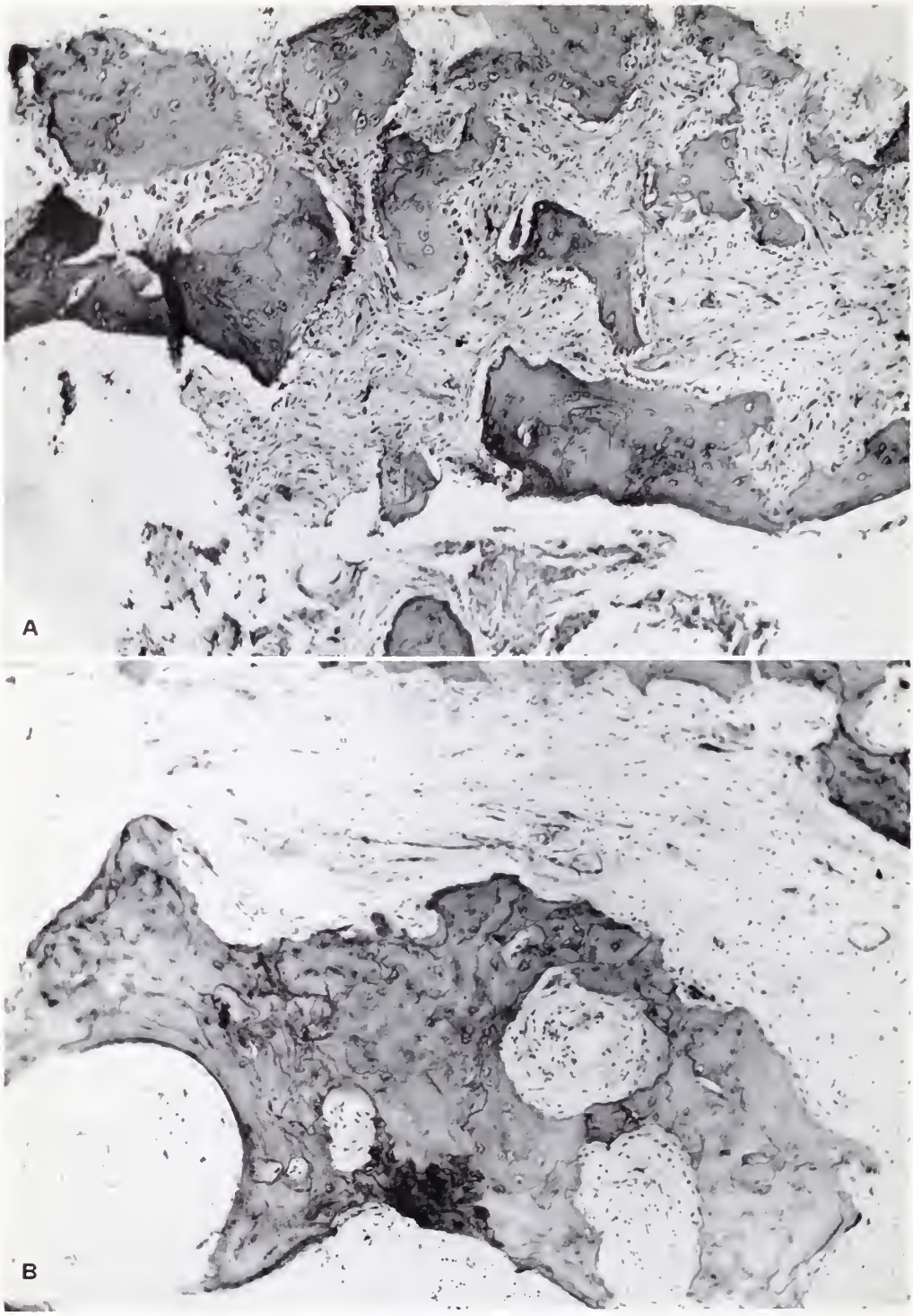

FIG. 8A. Skull biopsy in B. D. before therapy. Note the osteoclasts, osteoblasts and fibrous marrow. Serum alkaline phosphatase was 66 B.U. This and subsequent photomicrographs were made at a magnification of 100 ×.

FIG. 8B. Skull biopsy in B. D. after 11 days massive cortisone therapy. Serum alkaline phosphatase was 77 B.U. at this time. Dose of cortisone was 500–1000 mg. daily.

FIG. 8C. Skull biopsy in B. D. after 49 days of massive cortisone therapy. Serum alkaline phosphatase was 11 B. U. Note the progressive disappearance of osteoclasts, osteoblasts and marrow cellularity. The fibrous appearance of the marrow is replaced by a fine fibrillar appearance. Treatment had to be stopped because of pain due to development of collapsed vertebrae. The collapsed vertebrae were not involved with Paget's disease by x-ray. Vertebral collapse was attributed to acute osteoporosis induced by massive cortisone therapy.

diminished toward normal during intensive corticosteroid therapy.

Concomitant with these investigations an attempt was made to maintain prolonged suppression of Paget's disease with corticosteroids. When large effective doses (cortisone 500–1000 mg. daily) were used for many months the uninvolved vertebrae became osteoporotic and fractured spontaneously. One patient treated with smaller doses (cortisone 75 mg. daily) for three years showed no change in serum alkaline phosphatase levels or in histological appearance of serial bone biopsies (Figure 10).

It was finally concluded that Paget's disease was one of many diseases of unknown etiology which are suppressed by hypercortisolism. The harmful effects of hypercortisolism on the normal bones and on other tissues precluded the use of these compounds as therapeutic agents.

V. Aspirin Effects in Paget's Disease

During the five years following publication of the corticosteroid studies, investigators in England and the United States demonstrated that aspirin was as effective as cortisone in suppressing rheumatic fever. In 1960, Dr. Peter F. Maurice suggested that Paget's disease might also respond to aspirin as well as to corticosteroids and in the past two years this suggestion has been tested in a sizeable group of patients. The first four balance studies have been published elsewhere (7).

As shown in figure 11 aspirin produced a prompt fall in serum, urinary and fecal calcium. There was a suggestion of return of calcium balance to control levels with prolonged aspirin administration much as was noted previously in the ACTH and cortisone studies. At the same time urinary and fecal magnesium similarly decreased although fasting blood levels were unchanged. Phosphorous

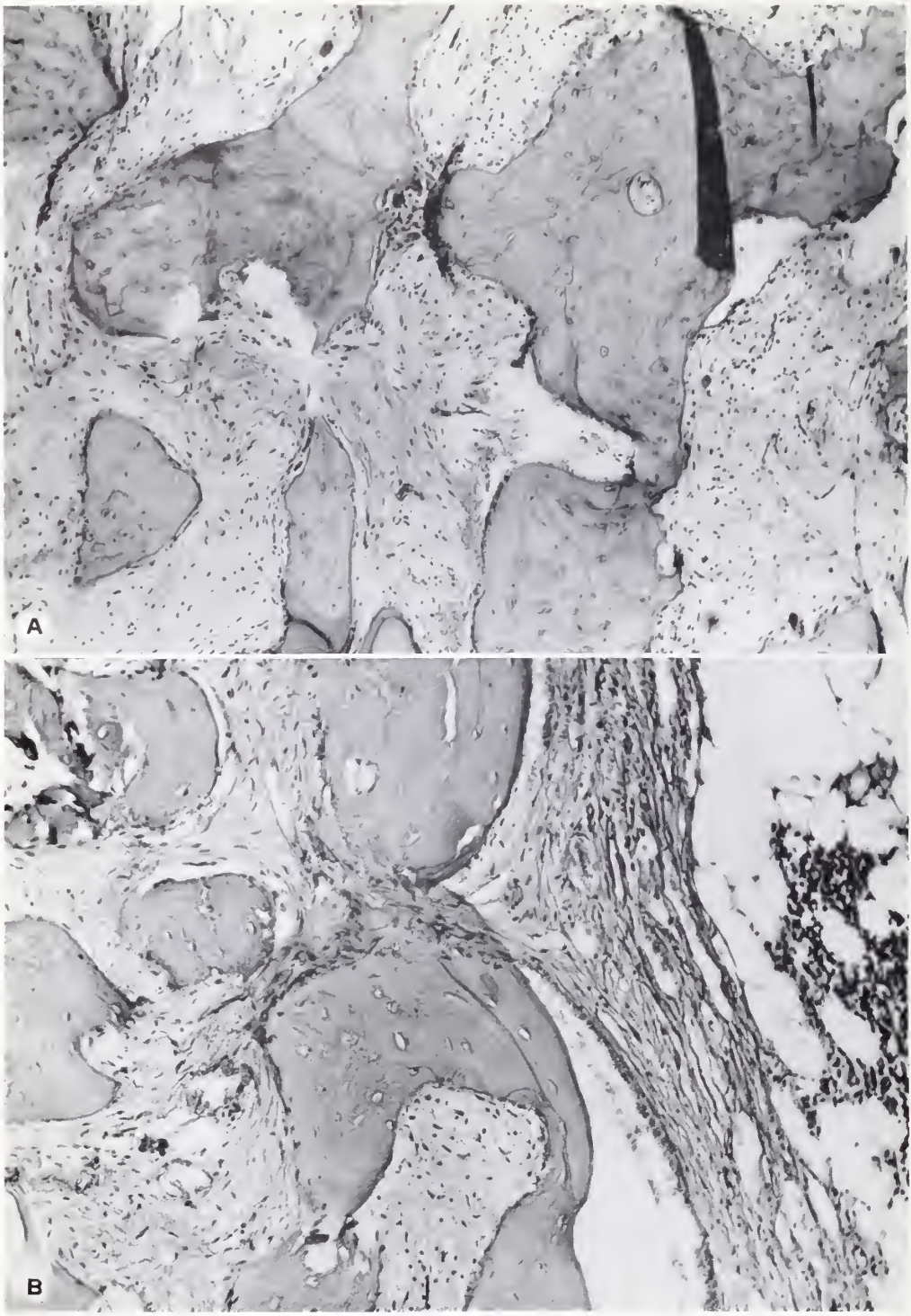

FIG. 9A. Skull biopsy in J. D. before therapy. Serum alkaline phosphatase was 46 B.U. Note the classical features of numerous osteoclasts, multiple active appearing osteoclasts, and a fibrous cellular marrow.

FIG. 9B. Skull biopsy in J. D. after 17 days massive cortisone therapy. Serum alkaline phosphatase was 22 B.U. The dose of cortisone was 300–600 mg. daily.

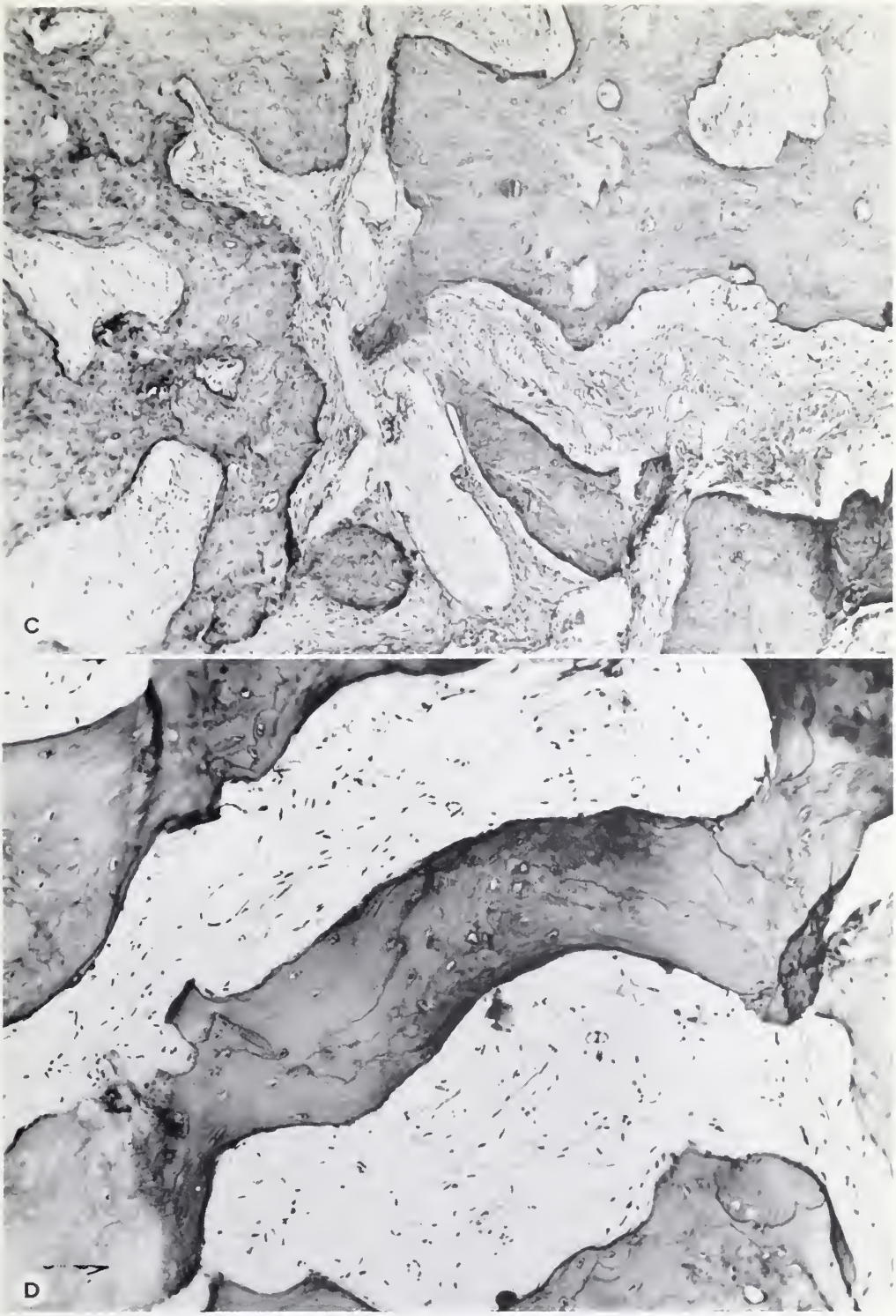

Fig. 9C. Skull biopsy in J. D. after 31 days massive cortisone therapy. Serum alkaline phosphatase was 6 B.U.

Fig. 9D. Skull biopsy in J. D. after two years massive cortisone therapy. Serum alkaline phosphatase was 8 B.U. Note the striking disappearance of osteoclasts, osteoblasts and marrow cells. In some areas fat appears to be accumulating in certain cells and this suggests return of the normal fatty marrow. Cortisone therapy had to be discontinued at this time due to many changes of induced Cushing's syndrome, including osteoporosis and collapse of vertebrae not involved with Paget's disease by x-ray.

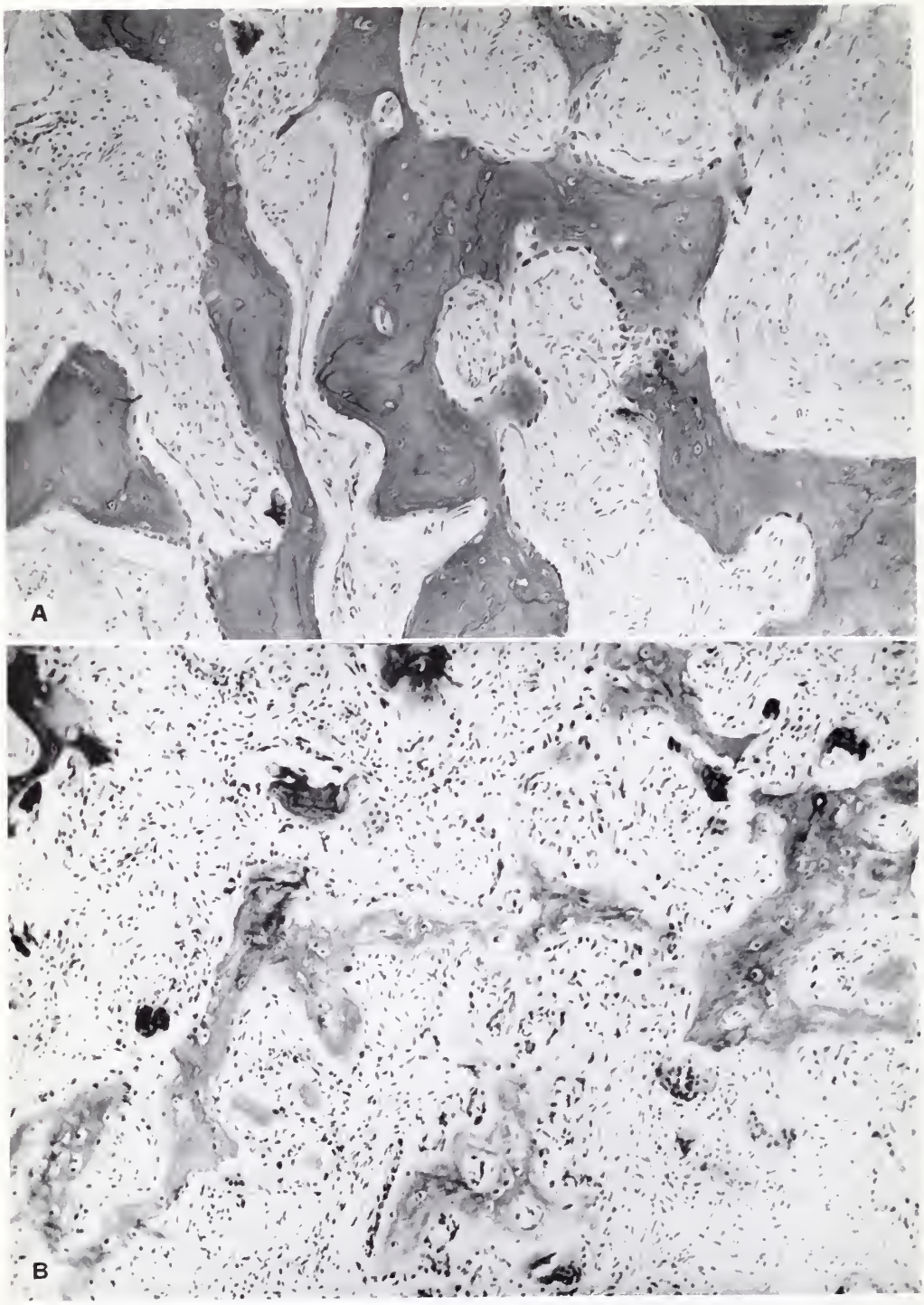

FIG. 10A. Skull biopsy of A. M. before treatment. Note the evidence of active bone formation and resorption. Serum alkaline phosphatase was 100 B.U.

FIG. 10B. Tibial biopsy of A. M. after treatment with cortisone 75 mg daily for three years. There is no evidence of suppression of Paget's disease by this dose level of cortisone. Serum alkaline phosphatase was 210 B.U.

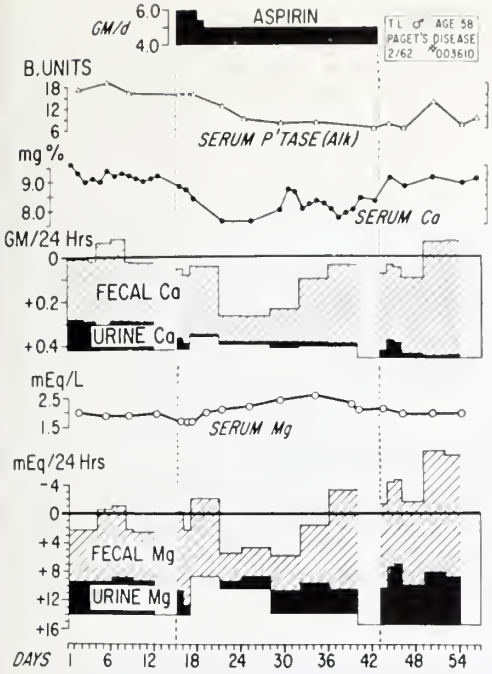

FIG. 11. Effects of aspirin in T. L., a 58 year old man with Paget's disease. Note the decrease in serum, urinary and fecal calcium on aspirin, the tendency for calcium excretion to return to control levels after 15 days therapy, and the fall in serum alkaline phosphatase after approximately six days treatment. Note also the decrease in urinary and fecal magnesium despite a slight rise in serum values during aspirin administration. (Reprinted with permission[5].)

balance showed no consistent pattern. Serum alkaline phosphatase was unchanged for the first six days and then decreased toward control levels while calcium excretion was returning to control levels.

Tables 1 and 2 summarize four calcium[47] kinetic studies in patients with Paget's disease before and after aspirin therapy. Calculated exchangeable calcium pools, bone formation rates, and bone resorption rates were increased in all four patients with Paget's disease. After aspirin all parameters returned toward normal.

Figure 12 illustrates the urinary excretion of total hydroxyproline by normal subjects and the greatly increased excretion of patients with Paget's disease.

As shown in figure 13 one patient with Paget's disease appeared to respond to aspirin and then escaped the typical effects. Analysis of his blood revealed that initially high blood salicylate levels were not maintained. It was subsequently learned that the patient surreptitiously had rejected most of his aspirin therapy. The data are interpreted to indicate that blood salicylate levels of 25–40 mg.% are required for the characteristic effects in Paget's disease and that much lower blood levels are ineffective.

In figure 14 is summarized a balance study

TABLE 1

CALCIUM[47] KINETICS IN FOUR PATIENTS WITH PAGET'S DISEASE AS COMPARED WITH AVERAGE VALUES IN FIVE NORMAL SUBJECTS

Patient	E* (gms)	K†	BFR‡ mg kg day
G. B.	12.19	0.187	42.61
W. J.	9.09	0.247	45.08
C. R.	33.33	0.182	113.60
T. L.	10.00	0.203	31.47
Normals	6.00§	0.116§	10.00§

* E = exchangeable calcium pool

† K = disappearance constant = $\frac{0.693}{t^{1/2}}$

‡ BFR = "bone formation rate"

§ Mean values for 5 normal subjects

TABLE 2

EFFECTS OF ASPIRIN TREATMENT ON CALCIUM[47] KINETICS IN THREE PATIENTS WITH PAGET'S DISEASE

Patient	E* (gms)	K†	BFR‡ mg kg day
T. L.			
Before therapy	10.00	0.2031	31.47
During therapy	6.25	0.1823	18.26
C. R.			
Before therapy	33.33	0.1821	113.60
During therapy	22.46	0.1678	37.68
W. J.			
Before therapy	9.09	0.2471	45.08
During therapy	5.12	0.1972	20.03

* E = exchangeable calcium pool

† K = disappearance constant = $\frac{0.693}{t^{1/2}}$

‡ BFR = "bone formation rate"

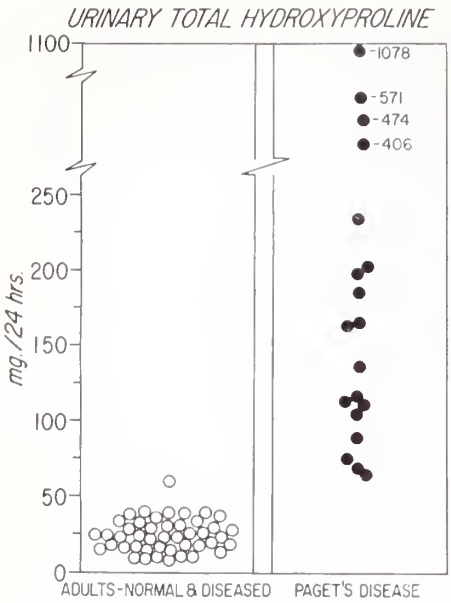

FIG. 12. Urinary total hydroxyproline excretion in forty five subjects without bone disease and in nineteen patients with Paget's disease. Urinary collections were made during gelatin free diets. Hydroxyproline was determined by the method of Prockop and Udenfriend.[9]

in a 46-year old man with virtually generalized Paget's disease. Simple bed rest produced striking hypercalciuria and increased urinary hydroxyproline while the serum alkaline phosphatase decreased markedly. The addition of aspirin during partial immobilization decreased hypercalciuria and hyperhydroxyprolinuria. Cessation of aspirin therapy permitted return of the increased excretion of both calcium and hydroxyproline.

One normal subject has been given similar doses of aspirin. In general calcium and magnesium metabolism were unaltered as were the normal blood levels of alkaline phosphatase and the normal urinary excretion of hydroxyproline (Figure 15).

As shown in figure 16 the histological appearance of skull biopsies improved toward normal after three weeks aspirin therapy in one patient. Too little time has elapsed to expect alterations in roentgenograms of bones and we have seen none. Most patients have reported relief of bone pain and excessive fatigue but this is difficult to evaluate since aspirin is an analgesic as well as an anti-inflammatory drug.

VI. Interpretation of Results with Aspirin

Five patients with Paget's disease have shown decreased calcium excretion on aspirin. Such calcium retention can occur only in the bones (and teeth) since more than 99% of the body's calcium is in these tissues. Calcium retention probably reflects suppression of the abnormally increased bone resorption rate rather than stimulation of bone formation rate since serum alkaline phosphatase levels decreased concomitantly. Magnesium retention following aspirin also probably reflects decreased resorption of bone containing magnesium-rich hydration shells and decreased return to the serum of this magnesium. Similar mag-

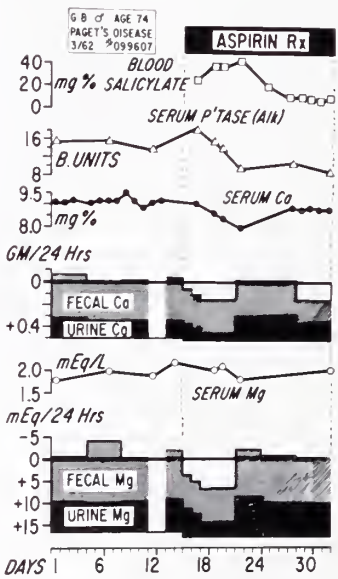

FIG. 13. Relation of blood salicylate levels and biochemical response in G. B., a 74 year old man with Paget's disease. Note the characteristic decrease in serum alkaline phosphatase, serum, urinary, and fecal calcium, and in urinary and fecal magnesium while blood levels of salicylate were 20–40 mg%. Note also that when blood salicylate levels fell to approximately 10 mg% due to surreptitious rejection of aspirin therapy calcium and magnesium balance returned to fore control levels as did urinary hydroxyproline (not shown).

nesium retention has been recorded following abrupt cessation of bone resorption after parathyroidectomy in patients with osteitis due to hyperparathyroidism (8).

The decrease in urinary hydroxyproline following aspirin is also interpreted as evidence for decreased bone resorption; the increase seen following immobilization probably represents increased bone resorption. Note is made that immobilization is the first condition reported to produce opposite effects on serum alkaline phosphatase and on hydroxyprolinuria. This evidence argues strongly against hydroxyprolinuria reflecting bone formation rate but would equally well fit the suggestion that hydroxyprolinuria represents soluble collagen which failed to be incorporated into mature collagen when osteogenesis failed to keep pace with collagenesis.

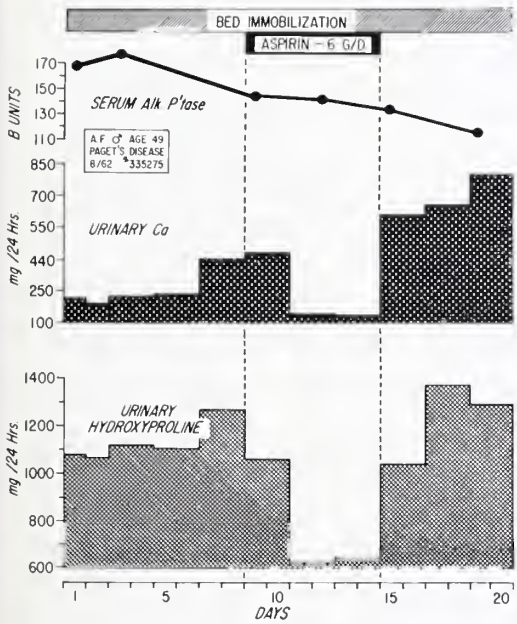

Fig. 14. Effects of immobilization and aspirin in A. F. A. F. had essentially generalized Paget's disease. Note the rise in urinary calcium and hydroxyprolinuria coupled with the fall in serum alkaline phosphatase during the mild immobilization of bed rest. Aspirin administration decreased hypercalciuria and hydroxyprolinuria and serum alkaline phosphatase continued to fall. When aspirin was discontinued urinary calcium and hydroxyproline returned to the levels seen prior to aspirin.

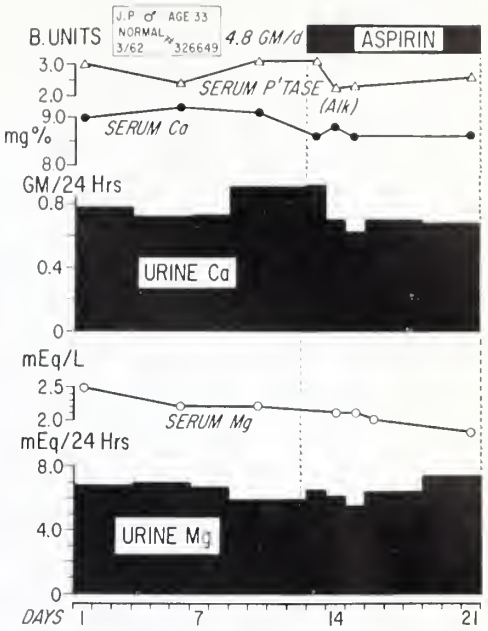

Fig. 15. Effects of aspirin in J. P., 33 year old normal subject. During eight days of aspirin administration no significant change occurred in serum alkaline phosphatase and calcium, urinary calcium and magnesium, or in urinary total hydroxyproline excretion (not shown).

Analysis of the calcium[47] kinetics also supports the view that the greatly accelerated calcium turnover of Paget's disease is suppressed by aspirin. Calculation of endogenous fecal calcium secretion suggests that decrease in this parameter accounts for the lower net fecal calcium observed during aspirin administration.

Few skull biopsies are available to date. The most one can say is that the initial results are strongly reminiscent of those seen following cortisone therapy. With cortisone there occurred definite changes toward normal in the number of osteoblasts and osteoclasts and in the return of fat and hematopoietic cells.

VII. General Conclusions

The striking changes in all parameters of bone metabolism produced in patients with Paget's disease with corticoids and with aspirin arouse hope that treatment for this disease is now possible. The changes observed with ACTH and cortisone suggested that Paget's

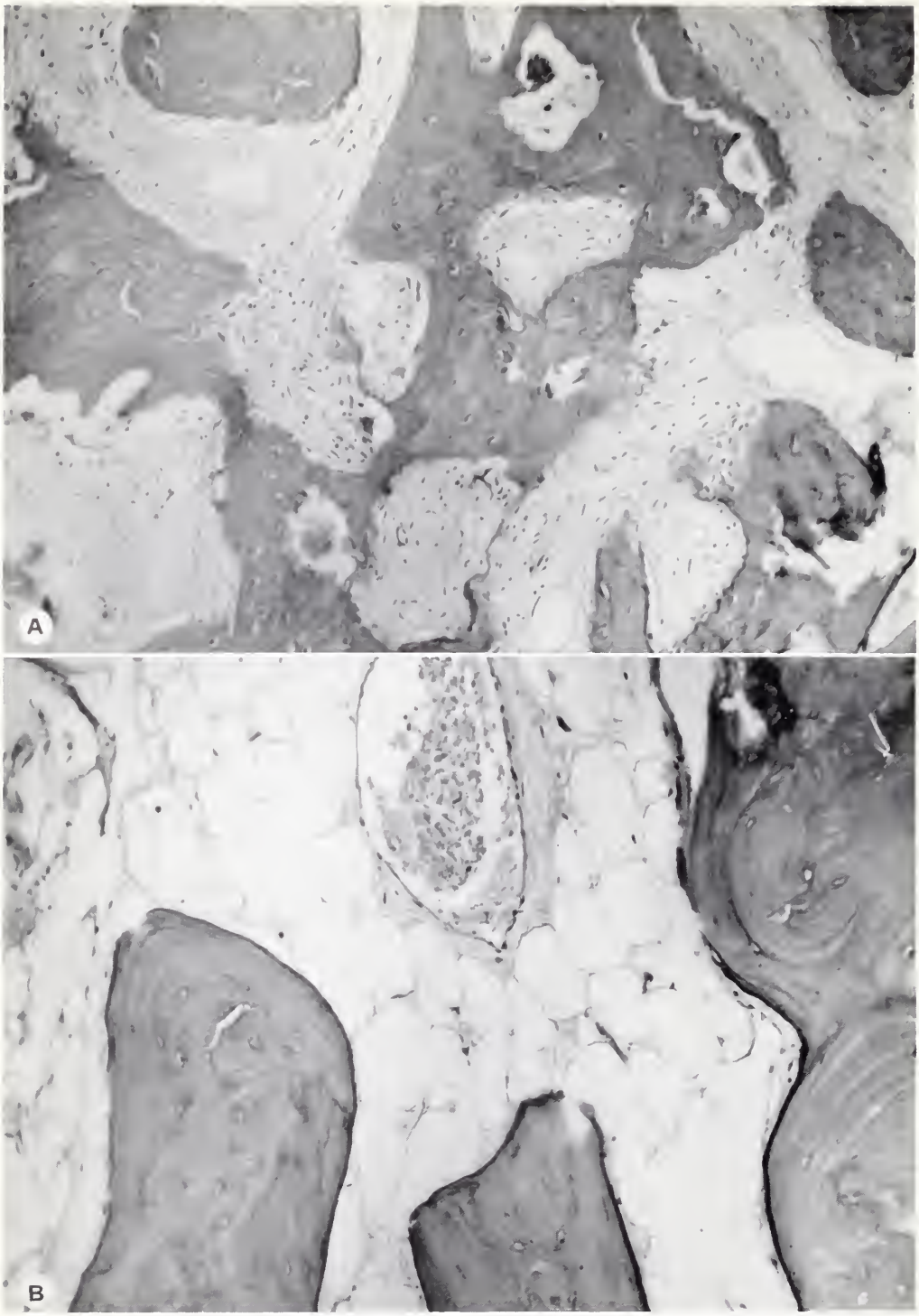

FIG. 16A. Photomicrograph of a skull biopsy in C. F. before treatment. All areas of the histological section were similar. Serum alkaline phosphatase was 14 B.U.

FIG. 16B. Photomicrograph of skull biopsy in C. F. after 21 days aspirin administration. The histological section showed more variability than that photographed in Figure 16A. As judged by this single biopsy there appeared to be return of fat cells, disappearance of osteoclasts and osteoblasts, and decreased cellularity of the "fibrous" marrow.

disease could be suppressed temporarily but the side effects of these agents prevented their use in prolonged therapy. Now it appears that aspirin will elicit similar changes which we interpret as suppression of Paget's disease.

The observation of suppression of Paget's disease by two antiinflammatory agents recalls Sir James Paget's original interpretation of this disease as an osteitis and inflammatory in nature. Perhaps this reminder will rekindle interest in the search for an infectious, inflammatory or immunologic agent in Paget's disease and it certainly encourages all of us to look at patients with this disease with renewed insight and interest.

Prolonged aspirin therapy is known to be quite harmless and hence the prospect arises of prolonged suppression of Paget's disease without significant risk. It remains to be seen whether progression of Paget's disease will be prevented and whether actual improvement in structure and function of affected bones will occur. If Paget's disease can be chronically suppressed perhaps a decreased incidence of sarcoma, renal stones, deafness, progressive neurological defects, and pathological fractures will be happy by-products of this research.

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Typhoid Fever: A Discussion of its Pathogenesis, Physiologic Abnormalities and Management[1]

By THEODORE E. WOODWARD, M.D.[2]

TYPHOID fever was recognized and described as a distinctive enteric disease by early nineteenth century French clinicians. It remained for William Wood Gerhard, of Philadelphia, to make the first clearcut distinction between typhus and typhoid fever based on his personal clinical and pathologic findings of six patients. Gerhard (1) wrote in 1836: "the anatomical characters of these varieties of fevers are peculiar to themselves and it is impossible to substitute the lesion of the follicles of the small intestine observed in typhoid fever from the pathological phenomena of typhus as it is by other treatment or other means to transform the eruption of measles into pustules of smallpox."

Later, the causative bacillus was identified and characterized by Eberth and Gaffky (2, 3). Subsequent attempts have been made to define the mechanisms by which the typhoid bacillus provokes the pathologic changes and produces the clinical manifestations (4, 5).

Our program, designed to define the efficacy of the presently available typhoid vaccine, has been conducted in collaboration with the Commission on Epidemiological Survey of the Armed Forces Epidemiological Board. These studies have provided the unique opportunity to investigate the pathogenesis of typhoid fever permitting pertinent observations in volunteers prior to their infection, during the active stages of disease, and for extended periods thereafter.

The physiological and clinical studies upon which this paper is based were performed in collaboration with, or by, my colleagues, Dr. Joseph E. Smadel (6), Chief of Laboratory of Virology and Rickettsiology, Division of Biological Standards, National Institutes of Health; Dr. Sheldon E. Greisman, Assistant Professor of Medicine and Physiology; Dr. Richard B. Hornick, Assistant Professor of Medicine; and Dr. Frank A. Carozza, Jr., Intern in Medicine, of the University of Maryland School of Medicine and Hospital.

Fifty-three of 62 volunteers have contracted overt typhoid fever following ingestion of viable *Salmonella typhosa* isolated originally from the bile of an asymptomatic carrier. Two subjects experienced bacteremia without overt clinical evidence of disease. Patients clinically ill developed classic typhoid fever with bacteremia, positive stool cultures and immunologic response. Shown in figure 1 is the graphic record of a 28 year old man whose course is representative of the type of illness provoked. Bacteremia was first noted on the seventh day post-infection with headache, anorexia, myalgia, toxemia and febrile pattern all similar to the natural illness. Antibiotic treatment was initiated on the fifth febrile day and recovery ensued promptly with defervescence complete in three days. This type of response has been uniform.

Pathogenesis

One of the primary considerations is whether the endotoxin (somatic of O antigen) component elaborated by *S. typhosa* produces the pertinent clinical signs and morphologic alterations in typhoid infection. F. B. Mallory, in 1896 (7), concluded: "the typhoid bacillus produces a mild diffusible toxine partly within the intestinal tract, partly within the blood and organs of the body. This toxine produces proliferation of endo-

[1] Mary Scott Newbold Lecture LXXXIV, The College of Physicians of Philadelphia, 6 February 1963.

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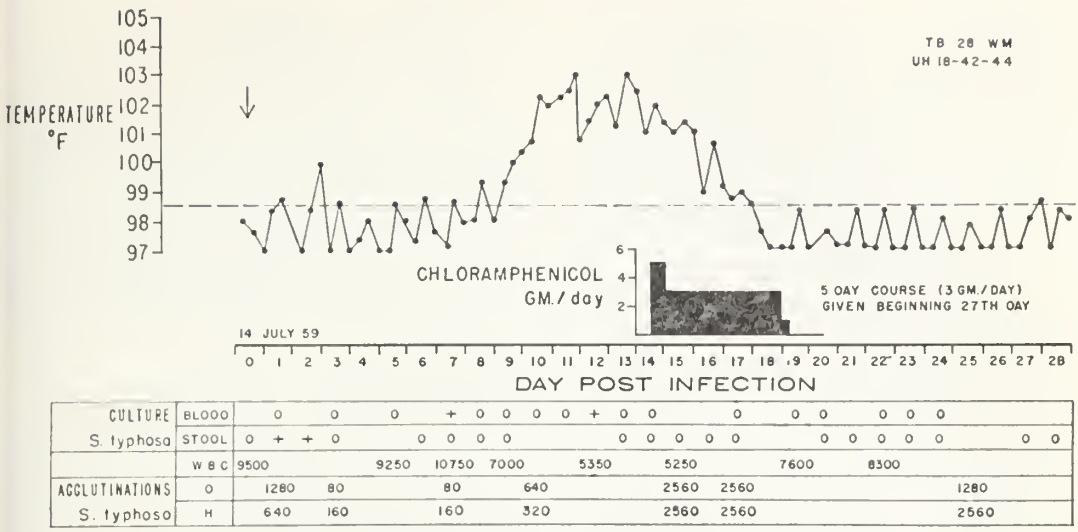

CULTURE	BLOOD	0		0		0		+	0	0	0	0	+	0	0			0		0	0		0	0	0				
S. typhosa	STOOL	0	+	+	0			0	0	0	0				0	0	0	0	0			0	0	0	0	0			0	0
	W B C	9500				9250		10750		7000			5350			5250				7600			8300						
AGGLUTINATIONS	O		1280		80			80			640					2560		2560								1280			
S. typhosa	H		640		160			160			320					2560		2560								2560			

FIGURE 11

FIG. 1. Typhoid fever. Typical pattern of induced typhoid fever in a previously healthy male volunteer. Viable *S. typhosa* were administered orally at time indicated by arrow. Reprinted from Trans. Assoc. Am. Phys. (Greisman *et al.* [5]).

thelial cells which acquire, for a certain length of time, malignant properties. New formed cells are epitheloid in character—and are characterized by marked phagocytic properties."

There are remarkable similarities between the host reaction during typhoid fever and the response following intravenous administration of purified endotoxin derived from *S. typhosa*. These similarities include the development of headache, chills, fever, anorexia, abdominal discomfort, myalgia, and general malaise which begin an hour after the intravenous infusion of as little as 0.5 mcg. of endotoxin. These are some of the dominant complaints in typhoid patients. Volunteers given endotoxin who subsequently developed typhoid fever, stated that their symptoms were comparable to those evoked by endotoxin. Other similarities included development of leukopenia and pathologic lesions. The lesions of typhoid fever are diffuse and are characterized by hypertrophy of lymphoid tissue and by focal necrosis in liver, spleen, cardiac muscle, bone marrow and lymph follicles (8). These lesions are not correlated with the presence of living bacteria for remarkably few typhoid bacilli are found in the Peyer's patches of the fatal case (9). Identical pathologic alterations observed in man during typhoid, can be produced in the rabbit by the intravenous administration of the purified endotoxin component (10).

Typhoid patients respond dramatically to the administration of cortisone; the antitoxemic effects and febrile response become apparent within hours (11). The antitoxemic properties of cortisone apply to endotoxin since several volunteers have been totally refractory to the effects of endotoxin while receiving Metacorten in ordinary pharmacologic doses (4). The mechanism of cortisone's antitoxemic effect is unknown.

Several physiologic alterations will now be discussed which suggest that endotoxin plays an important role in human typhoid fever, i.e., 1) altered vascular reactivity to the catecholamines, and 2) the acquisition of endotoxin tolerance.

Vascular Reactions to Catecholamines

The intravenous injection of bacterial endotoxin in rabbits and rats induces hyperreactivity of the peripheral vascular system to

epinephrine and norepinephrine (12–15). Hyperreactivity to the catecholamines during typhoid fever has been demonstrated (4, 5) in several ways. Standardized doses of norepinephrine were infused in volunteer subjects before and after typhoidal infection. At each step in the titration changes in arterial blood pressure (auscultatory method) and pulse were recorded simultaneously with appraisal of blood flow in the nail-fold capillary bed. The latter was determined by direct observation using a Leitz capillary microscope at 70× magnification. During the first stage of illness, the increments of systolic and diastolic pressures were three to four times the control values. Similarly, hyperreactive response patterns as evidenced by the lesser quantity of norepinephrine required to produce nail-fold capillary ischemia were noted. These hyperreactive responses continued into convalescence up to the twenty-sixth day.

Endotoxin alters the vascular reactivity of rabbits so that the catecholamines become potent necrotizing agents (12). The intradermal injection of epinephrine or norepinephrine produces local hemorrhagic necrosis in rabbits given bacterial endotoxin intravenously. During typhoid fever local hemorrhagic lesions occurred regularly in the skin following a dose of norepinephrine as small as 12 mcg. during the first week of illness. Hemorrhagic lesions occurred beginning fifteen minutes after injection and attained maximum size of 1 cm. within one to two hours. The reaction persisted for several weeks of convalescence. During the control period no hemorrhagic lesions occurred following the intradermal injection of 100 mcg. of norepinephrine. Microscopic sections of biopsy specimens of skin taken 72 hours after injection of 100 mcg. of epinephrine showed hemorrhagic necrosis, minimal inflammatory reaction, and fibrinoid necrosis of the walls of arterioles. Such hemorrhagic dermal lesions were never observed during the control observation periods nor did they occur in any of thirteen volunteers tested repeatedly with catecholamines throughout the course of tularemia and sandfly fever.

These findings suggest that vascular abnormalities occurring during typhoid fever are comparable to those induced when bacterial endotoxin is administered to rabbits and supports the thesis that endotoxin contributes to focal necrosis and hemorrhage in the intestinal tract and other organs during illness by altering vascular reactivity to the catecholamines.

Studies on Tolerance to Endotoxin

Tolerance to endotoxin is rapidly acquired following repeated exposure. If the premise is correct that endotoxin participates in the pathogenesis of the disease, then tolerance to this toxin should develop. Studies in volunteer subjects have shown that tolerance to the pyrogenic and toxic activities of endotoxin is acquired in man as early as the fourth convalescent day (5). These studies reveal that significant tolerance persists until approximately the fifth week and gradually approximates base levels on an average of twelve weeks (4, 5). These findings parallel those of Neva and Morgan (16) and suggest that sufficient quantities of endotoxin may be released into the circulation during overt typhoidal illness to result in not only altered vascular reactivity to catecholamines but also to the acquisition of significant endotoxin tolerance. Incidentally, tolerance did not develop in those individuals who failed to manifest overt illness, and one subject who developed bacteremia but who did not become clinically ill, also failed to develop tolerance (5).

If circulating endotoxin, indeed, constitutes a major factor responsible for the pathophysiologic alterations of typhoid fever, then man rendered tolerant to circulating endotoxin should exhibit minimal or no overt illness after challenge with viable *S. typhosa*. Volunteers were rendered tolerant by progressively larger, daily intravenous injections of either endotoxin of *Pseudomonas aeruginosa*

or *S. typhosa*. Despite this marked tolerance, no resistance to development of clinical overt typhoid fever was noted in the endotoxin-tolerant volunteers all of whom developed typical disease characterized by pyrexia, toxemia and bacteremia. However, tolerance to *S. typhosa* endotoxin was again evident upon retesting on the fourth convalescent day.

This observation that unaltered typhoidal illness can be induced in man in spite of marked tolerance to *S. typhosa* endotoxin appears to contradict the thesis that circulating endotoxin plays a major role in the pathogenesis of typhoid fever. Pertinent to the discussion is the well-known observation that a continuous high plateau of fever typifies the first ten days to two weeks of the natural illness under which circumstances there is undoubtedly a continuous elaboration of endotoxin from the sites of bacterial multiplication. By contrast in the laboratory the phenomenon of tolerance has been induced by daily intravenous intermittent injections of endotoxin with intervals of twenty-four hours (17). Most pertinent is the observation of Solomon (18) who infused typhoid vaccine continously for eight hours in fourteen patients with subacute bacterial endocarditis. The febrile response was sustained and not intermittent. Nelson (19) administered typhoid vaccine therapeutically to patients with neurosyphilis and devised the technique of administering a second dose two or three hours later during the height of the fever produced by the first. He described the effects of the second dose as "exploding the charge" which provoked fever to 107°F.

Doctors Greisman and Carozza rendered rabbits tolerant to 2.0 mcg. of *Escherichia coli* endotoxin by daily intermittent injections. At the time of tolerance on day seven, they utilized a different dose schedule, i.e., 1.0 mcg. *E. coli* endotoxin followed by a second comparable dose in one and one-half to two hours (4). Under these conditions there was an initial rise in temperature after a lag period of about fifteen minutes and within thirty minutes following the second intravenous injection, the temperature rose precipitously. Presumably, the second higher pyrogenic response occurred while the reticuloendothelial system or humoral mechanisms were effectively inhibited. This same phenomenon, a pyrogenic reaction in the presence of tolerance, occurred in convalescent typhoid patients given endotoxin by the divided dose technique.

It remained to be determined in man that tolerance to *S. typhosa* endotoxin, although established prior to and following illness, existed during active illness. Six volunteers were rendered tolerant by daily intravenous administration of increasing quantities of either *S. typhosa* or Pseudomonas endotoxin over a three week period. These subjects could then tolerate an intravenous injection of 2.5 mcg. of *S. typhosa* or 250 mcg. of Pseudomonas endotoxin with no reaction, whereas 0.5 mcg. or 25.0 mcg. respectively of the same materials initially evidenced severe toxic and pyrogenic reactions. Despite tolerance and elevated titers of somatic O agglutinins, they developed overt illness after ingesting viable typhoid bacilli. On the first day of clinical illness, these subjects were tested with 0.5 mcg. of *S. typhosa* or 25.0 mcg. of Pseudomonas endotoxin when the temperatures were about 101°F. In each instance marked febrile and toxic reactions ensued associated with prostration which necessitated the administration of hydrocortisone in one subject. Later in convalescence, tolerance to endotoxin was again evidenced.

A similar reaction pattern was observed in three volunteers rendered tolerant to *S. typhosa* endotoxin and infected with *Pasteurella tularense*. In all subjects, despite preceding tolerance, the reaction to endotoxin during overt illness with typhoid fever or tularemia were distinctly more severe than the initial baseline reaction to the same quantity of endotoxin. Parallel studies conducted in four volunteers infected experimentally with sandfly fever revealed that tolerance to *S. typhosa* endotoxin was maintained during illness and

full doses of endotoxin could be tolerated with no discomfort or increase in fever index.

Failure of the mechanisms responsible for endotoxin tolerance to operate effectively during overt typhoid illness supports the initial concept that circulating endotoxin does play a role in these infections in which fever is sustained. When the typhoid infection is arrested and convalescence ensues for several days, the protective mechanisms which confer endotoxin tolerance again function effectively.

The mechanism for this loss of tolerance during typhoid fever cannot be attributed to depression of reticuloendothelial phagocytic activity. Accelerated activity of the reticuloendothelial system occurs only in early convalescence as evidenced by more rapid clearance of I-131 tagged heat-denatured human serum albumin (20). A current hypothesis nivolves the elaboration of humoral factors during the development of tolerance which either specifically neutralize or permit more rapid uptake of endotoxin by the reticuloendothelial system; during active typhoid fever the protective factors may be bound and thus inactivated by endotoxin released so that additional exogenous endotoxin remains free to induce toxic effects at target sites.

Several problems relating to typhoid fever are worthy of comment, such as the management and the complications of relapse and perforation of the intestinal lesion with peritonitis.

Management

General Supportive Measures

Regardless of the efficacy of antibiotic treatment, general care of the typhoid patient, including attention to nutrition and fluid replacement, is vital. Bed rest extending into convalescence is advised. Laxatives and the indiscriminant use of enemas are ill-advised because of the danger of inciting intestinal perforation or hemorrhage. Codeine is preferred for relief of headache since typhoid patients may show exaggerated reactions to the antipyretic action of analgesics such as salicylates. Tepid sponge baths are effective in lowering body temperature and should be employed when excesses of 104°F. appear.

Good nursing care should include special attention to oral hygiene, to adequate bathing, to careful observations of pulse, to the onset of vomiting or severe abdominal pain, and to the presence of bloody or tarry stools. Liquid or bland diets must be given depending upon the degree of toxemia, and dehydration must be prevented by careful adjustment of the water and electrolyte balance. Such clues as drowsiness, apathy, increase in nausea, weak pulse, hypotension, oliguria and syncope suggest excessive loss of water and minerals. Isotonic saline-glucose solutions are best for replacing salt and calories. The judicious transfusions of whole blood given slowly, aid severely ill, anemic patients.

Specific Treatment

The treatment of patients with typhoid fever remained symptomatic and supportive until 1948 when, with our colleagues in Malaya, it was possible to demonstrate that chloramphenicol drastically shortens the illness and reduces the mortality (21–23). Prior to that time the acute illness lasted from several weeks to several months and the mortality was about 12 per cent, with most of the deaths attributable to profound toxemia, intestinal perforation with peritonitis or intestinal hemorrhage.

Before discussing the developments since 1948, it might be appropriate to present the chart of one of the first typhoid patients to receive chloramphenicol (Figure 2). This 24 year old woman was given the antibiotic on the ninth day of illness. There was no lessening of pyrexia or toxemia in the first twenty-four hours of therapy, but by the third day these signs decreased and the general clinical condition was vastly improved. The patient became afebrile 3.5 days after initiation of therapy. *S. typhosa* was demonstrated in the blood on the ninth day of disease immediately before antibiotic was administered and in the feces on the fourteenth and twenty-first days.

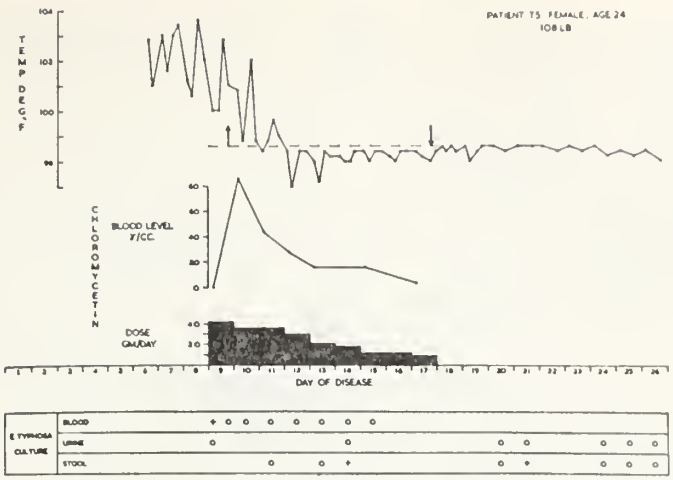

FIG. 2. Typhoid fever. Case T-5, one of the first such patients to receive chloramphenicol, became afebrile after three days of treatment. Reprinted from Ann. Int. Med., 1948. (Woodward, *et al.* [21]).

Subsequent cultures of blood and feces were negative for typhoid bacilli.

The specific therapeutic regimens which we employ for adults provide an oral loading dose of 3.0 Gm. of chloramphenicol followed by 3.0 Gm. daily for: (a) fourteen days; or (b) two courses of five days each, separated by eight days without antibiotic. Intravenous chloramphenicol, if required, should not exceed 4.0 Gm. daily and the oral route should be utilized as soon as feasible. In most patients the daily dose of chloramphenicol may be reduced to 2.0 Gm. during periods of normal temperature.

Smaller amounts of chloramphenicol have been shown by a number of investigators to be beneficial. Huckstep (24), who cared for seriously and moderately ill patients in the hospital and under primitive conditions in East Africa, gave chloramphenicol in 0.5 Gm. doses three times daily until the pyrexia settled and then in 0.25 Gm. amounts three times a day for two additional days. Chloramphenicol was then stopped and resumed only if fever recurred or complications developed. In patients who were only moderately ill, chloramphenicol was stopped when the temperature dropped to 100°F. Huckstep states on page 225 of his book: "This dosage scheme is far from perfect, and the relapse rate was high in these cases. The mild relapses, however, did not require treatment. This regimen allows for the maximum number of patients to be treated when supplies are short, and in practice I found it worked surprisingly well." Islam and Haq (25) also employed abbreviated courses of the antibiotic with appreciable success. These authors, working in East Pakistan, gave an initial dose of 0.5 Gm. followed by 1.0 Gm. daily until four to seven days after the temperature became normal. Even though such regimens may not be ideal, they undoubtedly are useful in treating typhoid in developing countries where drug supplies may be at a premium.

Steroid Treatment

Cortical steroids dramatically shorten the toxic febrile stage in typhoid fever (26–28), see Figure 3. Headache, toxic signs and fever abate in a matter of hours. Cortisone, 200 to 300 mg. daily, or prednisolone, 40 to 60 mg. daily, is given for *not more* than three days. These potent hormonal drugs should be administered along with chloramphenicol in the usual dosage. Steroid supplemental therapy is indicated only for those patients with severe toxemia and pyrexia who might expire if the toxic febrile state is not brought under control promptly; it should *not* be used as a routine

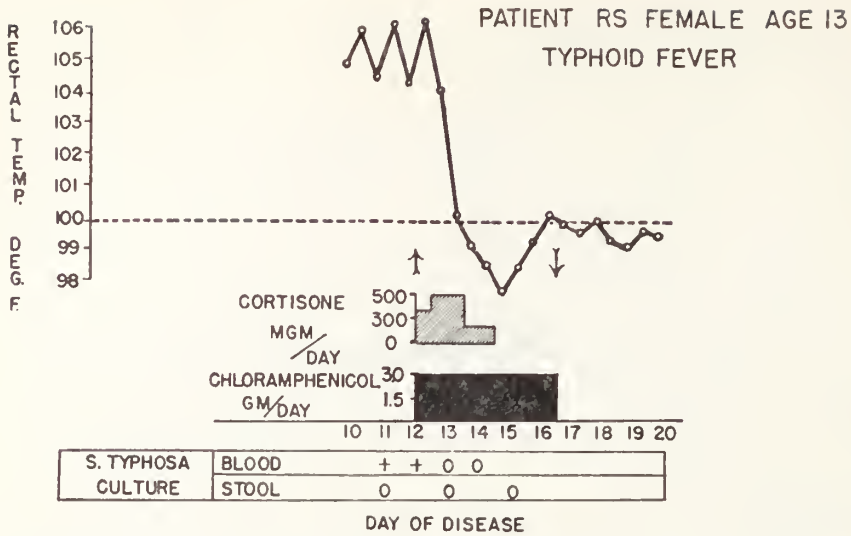

FIG. 3. Typhoid fever. Case R. S., became afebrile fourteen hours after instituting combined therapy with a large dose of cortisone and the usual amount of chloramphenicol.

practice (29). Such short-term steroid therapy for typhoid patients has not been associated in our experience with a higher incidence of perforation or hemorrhage of the intestinal ulcer (28).

COMPLICATIONS

Relapse

The relapse in typhoid fever is characterized by return of headache, anorexia, malaise and other signs of toxemia, fever, bacteremia, and occasionally the presence of rose spots. It is usually not as severe as the initial phase but in rare instances may be fatal. In general, the return of disease occurs about two weeks after the initial defervescence.

Among the 28,057 patients with typhoid fever reported in the European and American literature, Osler found that the relapse rates varied in different clinics from 3 to 18 per cent; however, the rate for the entire group was 8.8 per cent (30).

It seemed reasonable to hope that an effective chemotherapeutic agent would lower the incidence of this complication in typhoid fever. Such was not the case with chloramphenicol since relapses ensued in spite of: (a) the amount of the daily dose; (b) the duration of treatment; (c) the initial severity of the disease; (d) the day of disease on which therapy was begun; or (e) concurrent administration of typhoid vaccine with the antibiotic regimen. Most investigators seem to agree that the majority of these factors influenced the relapse rates encountered in their own series of cases; however, not all workers attach the same importance to each of the factors.

In general, adult typhoid patients who receive 20–30 grams of chloramphenicol over a period of about two weeks have a relapse rate of about 20 per cent. Among the first 436 reported cases of typhoid fever treated with this antibiotic that we reviewed in 1952 (29), the average relapse rate was 18.3 per cent. This compilation did not include the rather homogeneous group of 201 patients treated by Marmion (31) according to one of several different regimens. Marmion's patients who received a course of antibiotics similar to that mentioned above had a relapse rate of 18.2 per cent, while those who were given typhoid vaccine in addition had a rate of 17.6 per cent. In sharp contrast, the group which received a total of about 18 Gm. of antibiotics, given in two courses of five days each with a

seven day interval between courses, had a relapse rate of 42.3 per cent. Only 4.8 per cent of relapses occurred in the companion group that also had vaccine concurrently. These last-mentioned observations of Marmion differ widely from those of certain other investigators. Our own experience with the divided course of drug in a group of twenty cases provided a relapse rate of about 5 per cent (32). Moreover, other workers have obtained less striking reduction of relapse in patients to whom chloramphenicol and typhoid vaccine were administered (24).

Most authors are in agreement that relapses occur more frequently among patients who are treated early in the disease, particularly during the first week, than among those treated late. However, El Ramli's (33) observations were different; he noted a progressively increasing rate in the groups in whom treatment was instituted during the first, second and third weeks, respectively. In our recent experience with fifty-three patients who were treated not later than the third day after onset of fever, eight relapsed, giving a rate of 17.0 per cent. However, it is interesting that among the first twenty-four in this series no relapses occurred. Had we discontinued the study at this point, we would have erroneously concluded that the relapse rate was low under these circumstances. Perhaps too many of the investigators, including ourselves, have worked with numbers of patients that are too small to provide statistically significant data on the various factors which influence the occurrence of relapses. Rowland's observations on the progressive increase in relapse rates as the total dosage of chloramphenicol was decreased, stands as a welcome exception to the above suggestion. He showed that his results were statistically significant (34).

Investigators have proposed a variety of explanations for relapses in treated cases of typhoid fever. The simple explanations which have been offered, including our own, have not provided a working hypothesis which would permit the physician to develop procedures that would consistently reduce the relapse rate to an acceptable low figure. In future work, it might be well to concentrate one's attention on the reasons for the failure to develop solid immunity in the untreated case. After all, the relapse rate here is about 10 per cent. Why is it that after a febrile illness of four to six weeks, a proportion of untreated typhoid patients lack solid immunity and after a brief respite again develop the disease?

In closing the discussion of relapses it may be noted that *S. typhosa* recovered during relapses is almost invariably as sensitive to chloramphenicol as is the organism recovered from the same patient before treatment is begun. Thus, the drug is as effective in terminating the acute illness associated with the relapse as it is when first given.

Intestinal Perforation

Intestinal perforation is the most serious of all complications in typhoid fever. Osler considered it almost invariably fatal without operation, and even with surgical intervention 13 of his 20 patients died, cited by Huckstep (24). With modern antibiotic treatment and medical supportive care, the mortality associated with this complication has been greatly reduced.

Incidence

Osler noted that among 34,916 reported cases of typhoid fever, the incidence of intestinal perforation was 3.1 per cent (30). Stuart and Pullen (35), just prior to the antibiotic era, observed this complication in 1.9 per cent of 360 cases. The introduction of chloramphenicol did not eliminate perforation; indeed, it did not materially reduce the occurrence. For example, El Ramli encountered perforation in 3.5 per cent of his 200 untreated patients (33), Marmion (31) observed this in two of his 330 cases (0.7 per cent), and Friedman (36) encountered it once among his 122 treated patients (0.8 per cent). Eight among Rowland's 530 patients perforated (37); however, since four did so before chloramphe-

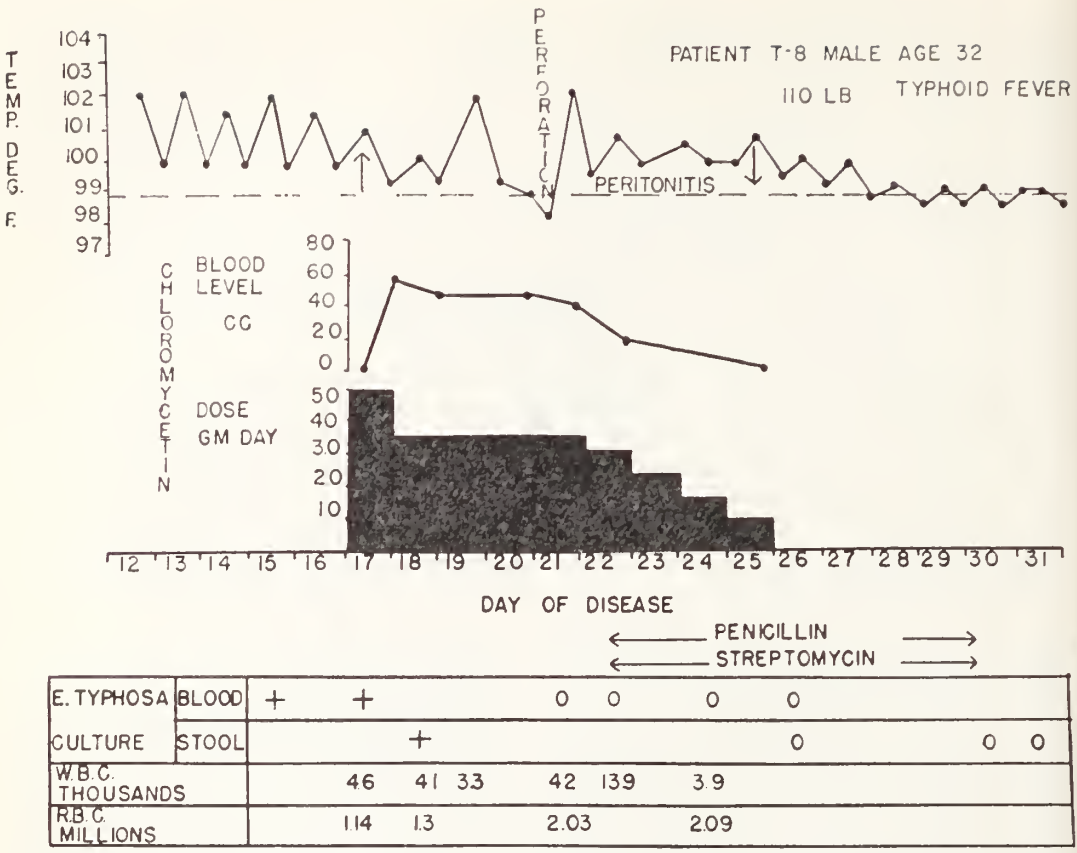

FIG. 4. Typhoid fever. Case T-8. This patient was on chloramphenicol therapy and developed intestinal perforation and peritonitis but recovered without surgical intervention. Reprinted from J. Clin. Invest., 1950. (Woodward *et al.* [23]).

nicol was administered, the rate among the treated patients was 0.8 per cent. We recorded three perforations (5.1 per cent) in our first fifty-eight typhoid patients who received chloramphenicol (29). However, only two of these should be considered in this connection (3.4 per cent) since the other case had already perforated when the drug was first given. Figure 4 presents a summary of the clinical findings in our first treated typhoid patient who suffered intestinal perforation. This man survived without surgical intervention—we shall return to this point again. Regarding perforation in treated patients, we stated in 1950 (23): "It must be realized that patients become afebrile before the intestinal lesions are healed and, as a result, hemorrhage and perforation may occur after defervescence."

Detection of Perforation

Perforation of the intestine may occur in either the moderately or severely ill or the convalescent typhoid patient, and is not related to the severity of the illness. In the classic case with sudden rupture of the intestinal ulcer, signs of an acute abdomen ensue; these are manifested by collapse, increase in abdominal pain, muscle rigidity, distention with absent bowel sounds, disappearance of liver dullness by percussion, roentgenologic evidence of a layer of air under the diaphragm, and moderate leukocytosis. There are all gradations of the clinical pattern depending

upon the degree of leakage and soilage of the peritoneal cavity and the general debilitation of the patient. In some patients an abscess may form in the right lower quadrant or in the pelvis, while in others with slow leakage, clinical signs may be minimal and the small hole in the paper-thin portion of the affected intestinal wall may be promptly patched with exudate and omentum. Huckstep (24) emphasizes the difficulties in detecting perforation in the typhoid patient treated with chloramphenicol since the spillage is frequently almost sterile and the organisms in the presence of bacteriostatic concentrations of the antibiotic have less capacity to cause peritonitis. The resulting reaction may be limited to a localized area of adherent edematous bowel and exudate.

Management

Handling of the typhoid patient with a perforated intestine had changed radically since the introduction of chloramphenicol and the broad spectrum antibiotics. The debilitated, toxic condition of the patient, the weakened circulation, the friability of the intestinal lesion, the stress of anesthesia and of the operative procedure have all contributed to making the typhoid patient a poor surgical risk. Exploratory laparotomy with suture of the intestinal lesion can now be avoided in most instances with reliance placed upon: (a) control of infection with antibiotics; (b) well-established supportive measures such as fluid replacement to combat shock; and (c) the institution of gastric suction to decompress the distended bowel. Following the initial experience with the patient whose chart was summarized in Figure 4, we have used antibiotic therapy and supportive medical care as the means for treating a total of six cases of typhoid fever with perforation (23, 28, 32, 38, 39); one of these patients died (38). In two of these six cases, chloramphenicol was the only antibiotic employed. Two cases received penicillin and streptomycin as well as chloramphenicol, while the fatal case was treated with penicillin and chloramphenicol. The last of the six patients was given only aureomycin (39). Although the clinical diagnosis in this last case was typhoid fever, this could not be supported by laboratory data until several weeks after the patient was over the acute episode associated with perforation, therefore chloramphenicol was not used. In 1952 (29), our attitude pertaining to this serious clinical situation was expressed specifically: "Exploratory laparotomy with suture of the perforation can be avoided in many instances, with reliance placed on the control of infection with antibiotics, well-established supportive measures and the natural healing processes." Others have also depended upon antibiotic and medical care of the typhoid patient with a perforated intestine. Marmion (31) treated one of his two cases of perforation medically without employing surgery, while the other had antibiotic therapy plus surgical intervention; the latter failed to survive. Friedman's case had the benefit of both surgery and antibiotics (36). The largest series of cases of typhoidal perforation treated by antibiotics without surgery is that of Huckstep (24). Of his fifteen cases, four died, giving a mortality rate of 27 per cent. In addition, Huckstep treated, in this same manner, eight patients who had peritonitis without the classical signs of perforation. He assumed that these represented infection resulting from intestinal leakage associated with an undetected perforation; one of these died. Two of Rowland's eight cases with perforation died; both had the benefit of chloramphenicol for a number of days before death ensued and both were treated surgically. The six patients with perforation who survived, received chloramphenicol but it is not clear from the reports (37, 34) how many were operated upon and how many received other antibiotics.

Medical therapy alone has given surprisingly good results in reducing the mortality of typhoid patients with perforation and peritonitis, a fact accepted by medical and surgical authorities. Should it become obvious to the clinician and surgeon in attendance that the

infectious process is failing to localize as evidenced by the findings on examination, persistence of shock, continued leukocytosis, and other signs, it may be surmised that the ulcer is not healing and that surgical intervention is indicated. Huckstep (24) advocates the medical approach as the treatment of choice but accepts two situations in which this should be supplemented by surgical procedures, i.e., (a) sudden perforation in the convalescent patient observed within six hours—such patients are better surgical risks than those acutely ill with typhoid fever, and (b) perforation which has led to complications, such as abscess or adhesions causing obstruction.

Intestinal Hemorrhage and Other Complications

A variety of complications other than intestinal perforation and relapse are encountered in typhoid patients. Active or slow bleeding may occur when the intestinal lesion undergoes necrosis and sloughing, although the early hyperplastic edematous Peyer's patch may ooze blood. In our initial series of 58 patients (29), gross bleeding occurred in 13.8 per cent; this exceeded the experience of Huckstep (24), Rowland (37), and Marmion (31), who reported an incidence of 3.0, 1.7 and 1.0 per cent, respectively. Prior to the era of specific treatment the incidence varied from 7 per cent of 23,271 patients in Osler's series (30), to 21.0 per cent of 360 cases studied by Stuart and Pullen (35).

Our impression that short-term corticosteroid treatment (28) did not predispose to intestinal hemorrhage in typhoid patients has been confirmed by Rowland (34).

Either a specific typhoidal or pneumococcal lobar pneumonia may develop at the height of the disease and should be confirmed by appropriate tests; chloramphenicol alone provides adequate antibiotic therapy for typhoidal pneumonia and for most pneumococcal pneumonias. Other pyogenic complications such as parotitis, sinusitis or furunculosis may require ancillary antimicrobial measures or surgical procedures. Typhoidal meningitis is rare but serious. Chondritis, periostitis, osteomyelitis or arthritis appear as acute or indolent focal infections from which *S. typhosa* may be isolated. Right upper abdominal pain, muscle spasm, rigidity and leukocytosis may herald a specific acute cholecystitis which is occasionally followed by a chronic infection with gallstones from which viable typhoid bacilli may be isolated months or years later.

Myocarditis is one of the nonspecific toxic reactions common in many infectious diseases. Hemolytic anemia is a rare serious complication; fortunately, it responds to ACTH (40). Recently, my colleague, Doctor Hornick, observed a severe hemolytic reaction during the course of typhoid fever. Recovery was prompt with supplemental prednisolone therapy. All observers agree that *Herpes labialis* is rare. The complications of typhoid fever are adequately described in two recent publications (24, 37).

Summary and Conclusions

(a) The endotoxin of *S. typhosa* appears to mediate certain of the manifestations of typhoid fever. The morphologic lesions in the intestine, liver and elsewhere may be provoked by interaction of endotoxins and catecholamines. Vessels sensitized to endotoxin hyperreact to the catecholamines with subsequent necrosis of tissues. The parameters of increase in: (1) blood pressure, (2) nailfold hypersensitivity, and (3) cutaneous hemorrhagic necrosis with small doses of norepinephrine in typhoid patients support this hypothesis.

(b) Tolerance to pyrogenic and systemic action of endotoxin develops in the early convalescence of typhoid patients but the mechanisms responsible for tolerance cease during the active febrile stage of infection. Humoral mechanisms and reactivity of the reticuloendothelial system are under continued study.

(c) The high plateau of fever which typifies the first ten days to two weeks of the natural illness is attributed to the inability of the reticuloendothelial system to recover from, or to inactivate as efficiently, a continuous elaboration of endotoxin from the sites of

bacterial multiplication. The subsequent intermittent febrile pattern with ultimate defervescence must depend upon the ability of the system to marshall its resistance to the typhoid poison. Elimination of the typhoid bacillus and consequent reduction of the endotoxic mass is obviously pertinent.

(d) The treatment of patients with typhoid fever remained symptomatic and supportive until 1948 when, with our colleagues in Malaya, it was possible to demonstrate that chloramphenicol drastically shortens the illness and reduces the mortality. Prior to that time the acute illness lasted from several weeks to several months and the mortality was about 12 per cent, with most of the deaths attributable to profound toxemia, to intestinal perforation with peritonitis or to intestinal hemorrhage.

(e) The specific therapeutic regimens which we employ for adults provide an oral loading dose of 3.0 Gm. of chloramphenicol, followed by 3.0 Gm. daily for: (a) fourteen days, or (b) two courses of five days each, separated by eight days without antibiotic. Smaller amounts of chloramphenicol have been shown by a number of investigators to be almost as beneficial as our regimens and to present economic advantages in developing countries.

(f) Cortical steroids dramatically shorten the toxic-febrile stage in typhoid fever but are indicated only in patients with severe toxic-febrile manifestations. If used, they should be administered along with chloramphenicol but the hormones should *not* be continued for longer than three days.

(g) Regardless of the efficacy of antibiotic treatment, general care of the typhoid patient, including attention to nutrition, is vital. Dehydration and mineral deficiencies may develop and should be corrected.

(h) Before the antibiotic era, about 10 per cent of typhoid patients suffered relapses. In spite of the application of various therapeutic regimens, including continuous or interrupted courses of chloramphenicol with or without the administration of typhoid vaccine, relapses continue to occur. Indeed, patients given 20–30 Gm. of chloramphenicol over a period of two weeks have a higher relapse rate, i.e., about 20 per cent, than untreated patients. Such factors as: (a) the amount of the daily dose of antibiotic, (b) the duration of treatment, (c) the initial severity of the disease, (d) the day of disease on which therapy was begun, and (e) concurrent administration of typhoid vaccine along with the antibiotic regimen, all influence the frequency of relapse. One of the most important factors contributing to the frequency of relapse is the total dosage of chloramphenicol; as the dosage is decreased, the relapse rates increase. The essential immunologic reactions responsible for the patient's eventual recovery from typhoid fever are poorly understood. Presumably, they require some weeks to become effective and are not fully developed in that individual who relapses whether that person did or did not receive antibiotics.

(i) Intestinal perforation is the most serious of all complications in typhoid fever. Before antibiotics it was almost invariably fatal without operation and even with surgical intervention the majority of patients died. With modern antibiotic treatment and medical supportive care but without surgical intervention, the mortality from this complication is now about 30 per cent. This is a significant improvement.

(j) In addition to relapse and intestinal perforation, a variety of complications occur in typhoid fever; the most frequent of these is intestinal hemorrhage.

(k) In conclusion, chloramphenicol provides the best available treatment for typhoid fever and is lifesaving.

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George Hoyt Whipple, Nobel Prize Pathologist[1]

By GEORGE W. CORNER, M.D.[2]

GEORGE HOYT WHIPPLE, winner of the Nobel Prize for Medicine in 1934, will be eighty-five years of age on August 28, 1963. He began the study of medicine in 1901, during the period that Simon Flexner has called the Heroic Age of American Medicine. As a student Whipple was a pupil of some of the heroes of that age, men who brought European standards of research and teaching to our country. The background of his life-story, therefore, is that of American medicine from 1901 to the present time. His own part in it is the creation of two distinguished centers of medical science, one in San Francisco, the other in Rochester, New York.

Son and grandson of New Hampshire physicians, Whipple took his A.B. at Yale in 1900. Choosing the young Johns Hopkins Medical School for his professional studies, he placed himself in the best environment America could then provide for a medical student gifted for research. Early influenced by the eminent pathologist, William H. Welch, he joined Welch's department immediately after taking his M.D. in 1905. Two years later Whipple autopsied and described with remarkable accuracy the first recognized case of a rare disease, *lipodystrophia intestinalis*, usually called "Whipple's disease." A year in Panama as pathologist to Ancon Hospital gave him rich experience in tropical diseases, and resulted in a notable paper on blackwater fever (pernicious malaria).

[1] Kate Hurd Mead Lecture in Medical History XV, Woman's Medical College of Pennsylvania and The College of Physicians of Philadelphia, 19 March 1963. (Dr. Corner's account of his teacher and friend George Whipple is based on a full-length biography now in press and is therefore presented here in summary.)

[2] Executive Officer, American Philosophical Society, Philadelphia 6, Pennsylvania.

Back in Baltimore in 1908 Whipple began the studies on pathological physiology of the liver upon which his subsequent career as an investigator was founded. Beginning with experimental chloroform poisoning of the liver, he studied the bile and blood pigments and the formation of fibrinogen. In 1914 he was called to San Francisco to organize the Hooper Foundation, a medical research institute for which funds had been given to the University of California. In its laboratory he and a young colleague, Charles Hooper, discovered that the production of bile can be influenced by diet, and from this beginning Whipple proceeded after long experimentation to show that hemoglobin formation also can be stimulated by certain dietary constituents, of which liver is the most potent.

Whipple's studies were made on secondary anemia of dogs, induced by bleeding. His findings were, however, promptly applied to the study of pernicious anemia by George Minot and William Murphy of Boston. Their success in treating patients suffering with pernicious anemia was acclaimed in 1934 by the award of the Nobel Prize jointly to Whipple, Minot, and Murphy.

At the Hooper Institute, Whipple initiated a new and original plan for research fellowships for medical students, under which he trained fourteen successful physicians and medical scientists, including two deans of medical schools. His reputation as an investigator, the success of the fellowship scheme, and his obvious strength of mind and character resulted in 1921 in his appointment as dean of the University of California's medical school. After one year, however, he resigned that post to organize and direct a new medical school organized by the University of Rochester with funds supplied by George Eastman,

the Kodak magnate, and the Rockefeller-endowed General Education Board. This undertaking was part of a nation-wide program to strengthen medical education following the disclosures of Abraham Flexner's famous report of 1910, *Medical Education in the United States and Canada*. At Rochester, Whipple assembled an exceptionally able young faculty and with great practical judgment and economy erected plain but admirably convenient buildings for the school and for Strong Memorial Hospital.

At Rochester Whipple continued with success the student fellowship plan he had begun at San Francisco. Following the desire of the school's patron, George Eastman, he at first intended to teach dentistry in the medical school; but this plan proving impractical, Whipple developed a program of research fellowships for graduate dentists which has contributed greatly to the advance of research in American dental schools.

During these busy years of organization and development, Whipple never stopped his own researches. His investigations have followed three main lines. First, he followed up his discovery that a diet of liver stimulates the production of hemoglobin in secondary anemia, by years of work with a research team aiming to isolate specific chemical substances having the hemoglobin-building function. Although it now appears that no one substance alone serves in this way in secondary anemia (as vitamin B_{12} does in pernicious anemia), Whipple's team produced therapeutically useful concentrates which are now in clinical use. A second major effort dealt with the body's use of iron, leading to the remarkable conclusion that the animal body controls its iron content by regulating its intake from the digestive tract, not by controlling its excretion, as with most substances. The healthy body absorbs from the diet only what little iron it actually needs to keep in balance; the anemic body responds to the depletion of its blood by absorbing iron at a greater rate.

The third major line of Whipple's research had to do with the transport and utilization of proteins. This work led him to formulate the principle of "dynamic equilibrium of the plasma proteins," which is now an established principle of physiology. This study, begun thirty years ago, was brought to triumphant conclusion by Whipple's pioneering use of radioactive tracers to follow the amino acids and proteins throughout the course of their metabolic utilization. In all these investigations Whipple had the collaboration of devoted students and staff colleagues; scores of successful medical scientists who shared his work are now teaching and carrying on research in many of the country's medical centers.

Whipple will be remembered not only as an investigator and organizer, but also, as he especially desires, as a teacher. His careful, clear exposition of pathology from the lecture platform and in the autopsy room, and his fair, sympathetic administration as dean won him the regard of the students he has taught during a half century at Johns Hopkins, the University of California, and Rochester.

Both the institutions he organized continue to flourish, and stand in the front rank of medical education and research. George Whipple would be the first to say that his story does not concern one man; it is that of American medicine in our time, the story of our profession coming to maturity in a nation at the peak of its economic and intellectual powers.

The Birth of American Rheumatology[1]

By W. S. C. COPEMAN, M.D., F.R.C.P., O.B.E.[2]

AMERICAN rheumatology had its roots in Europe, so perhaps I may be allowed to say a few words about the early beginnings of our subject.

As we all know, gout was the first of the rheumatic diseases to be recognised and studied by the ancient Greek physicians, in the time of our great father Hippocrates. The fact that there were types of arthritis which do not arise out of the gouty diathesis was only recognised many centuries later. Indeed, we have to jump two thousand years, to the time of the European Renaissance, when we find the French royal physician, Guillaume de Baillou (often known better under his Latinized name as *Ballonius*), describing acute rheumatism under that name for the first time in 1585. A little later the great Thomas Sydenham—"The English Hippocrates"—confirmed this clinical finding, and also separated off the modern group of non-gouty chronic arthritics. This category he rather quaintly referred to as "the scorbutick rheumatisms," to emphasize their non-gouty nature.

It was not until we come to middle of the last century that Sir Alfred Garrod was able to differentiate them scientifically, by showing that the blood of gouty sufferers contains an excess of uric acid which he was able to crystallize out by his ingenious "thread test" (1848). Somewhat later he described the pathological and morbid anatomical differences between osteoarthritis and rheumatoid arthritis, coining this name for the latter disease in 1859.

Rheumatology could perhaps be said to have been started in America (on a somewhat doubtful level it is true) by a medically qualified native of Connecticut named Elisha Perkins, in 1789. This gentleman, having heard of the important experiments in electricity conducted by Galvani, decided to harness this new and powerful force to his own profit. "After much experimentation" he devised a method whereby he fastened rods of two different metals at one end, like a pair of compasses, and drew them slowly over the site of "any rheumatic or arthritic pain or swelling, in man or horse," whilst muttering certain important words. He soon made a large fortune from these "metallic tractors"—it is said that he sold a pair to George Washington himself for fifty dollars—and having patented them in both countries, sent his son to London to do likewise—which he did!

The other interesting, and much more distinguished, character of this period who made some contribution to our subject was Benjamin Rush, attending physician to the Pennsylvania Hospital and a signatory of the Declaration of Independence. He suggested the idea of focal infection from teeth as a causative factor in rheumatism and other diseases in 1801.

Apart from the introduction of salicylates in rheumatic fever in 1876, not much further interest was taken in the rheumatic diseases in Europe or America, other than by a few outstanding medical individuals, and the great army of quacks who were still dominating the field when I was young.

Organised rheumatology started in April, 1925, with the establishment of the International Committee on Rheumatism, by Drs. J. Fortescue Fox and Jan Van Breeman, (with myself as Secretary). The Committee's objectives were to interest both the medical profession and laity in the rheumatic group of diseases. These were completely ignored by physicians at this time, evidently being con-

[1] Twelfth Annual Pemberton Memorial Lecture, Twenty-Fifth Anniversary Meeting, Philadelphia Rheumatism Society, jointly sponsored with the Eastern Pennsylvania Chapter of the Arthritis and Rheumatism Foundation, 7 November 1962.

[2] 129 Harley Street, London W. 1, England.

sidered as an "Act of God" which should not be interfered with. Later the Committee hoped to promote research and educational schemes in every country.

Dr. J. Fortescue Fox was a pale, charming Quaker physician, of courteous and diffident manners. He had been tubercular in youth and remained delicate looking. He possessed, however, prophetic fervour to discover the sources and methods for controlling the rheumatic diseases; and as he was respected by seniors in academic circles, he was able to get the subject regarded by them as "respectable," for the first time. A major portion of credit for the present status of rheumatology must go to him.

Dr. Jan Van Breeman was a delightful, somewhat phrenic, Dutchman of tremendous enthusiasm, who was able and willing to put over his views on the sociological importance of the rheumatic diseases, without notice, in almost any known language. His views would have been more clearly appreciated had he not been completely toothless (except for one snag in the front) during at least the twenty years for which I knew him. A perfect foil for his friend Fox; he died only two years ago (1960).

At the Committee's second meeting, in 1926, Dr. Louis B. Wilson, the Director of the Mayo Foundation, attended as a guest, and expressed himself as much impressed with the importance of arousing interest in the U.S.A. On his return he talked with Philip S. Hench and Ralph Pemberton, both of whom were already interested, and they formed an American branch of the Committee, electing Pemberton as its Chairman.

Ralph Pemberton (1877–1949), who was born and medically qualified in Philadelphia, had been interested in rheumatism since 1911 and had had opportunity as a Major in the U.S.M.C. during the first World War, of studying under controlled conditions the largest collection of arthritics which till then had been collected together.

He accordingly visited Europe in 1927, at which time he was about 48 years old, to meet members of the Committee. I had the privilege of meeting him when he visited Sir Humphry Rolleston and Fox; and again ten years later, when we paid a return visit to Philadelphia. I remember him on this occasion, as he took me round his wards at the Abington Memorial Hospital—a spare, eager figure with a sane enquiring outlook on the problems of rheumatology. He was afflicted with a curious tic which caused him to throw his eyes momentarily up to the right, frequently whilst talking. This was a bit disconcerting at first meeting. Dr. Pemberton reported on his return from Europe in 1927, that he was encouraged and "much impressed that earnest men were engaged in a worthwhile cause."

So on his return to Philadelphia he enlisted his friend, Robert B. Osgood, the Boston orthopaedic surgeon, in the campaign. Both agreed that this must be conducted through the wider channel of internal medicine, and not the orthopaedic or any other more specialised field. They wrote a book together on the management of arthritics, in which this viewpoint is stressed; and they adopted the motto of the European Committee: "All important social illnesses should be attacked at their source, and not fought at their end." Pemberton eventually became President of the International League against Rheumatism, and was elected an Honorary Fellow of the Royal Society of Medicine of London in 1946—a rare honour.

In 1928 Fox and Van Breeman's committee was reorganised as the *Ligue Internationale*; and the journal "*Acta-Rheumatologica*" was founded. This was the first special journal on the subject and was typed by Van Breeman (with one finger) and mimeographed on foolscap sheets. Early copies are interesting to compare with a modern number of "Arthritis and Rheumatism," or "Annals of the Rheumatic Diseases," their direct descendants.

On March 17, 1946, Pemberton called an all-day meeting at the Racquet Club in Philadelphia, and the members present established themselves as the *American Com-*

mittee for the Control of Rheumatism, whose chief object was to create wider interest in this neglected field of medicine throughout the American Continent, and to lay plans for for the study and treatment of the rheumatic diseases. These original members were Charles Bass, Russell L. Cecil, Russell L. Haden, Melim S. Henderson, Joseph L. Miller, Archer O'Reilly, Robert B. Osgood—and a little later Almon Fletcher, Philip S. Hench, George R. Minot, Cyrus C. Sturgis, and Hans Zinsser. Pemberton, at the request of the Committee, wrote an editorial in the *Journal of the American Medical Association* (July 7th), explaining its purpose; and the achievements to date of the Committee in Europe. He and Osgood also drafted the first of the several excellent educational primers and booklets which were later issued both for lay and medical consumption.

We may remember today the final celebrated profession of faith by Pemberton, which had to be omitted, however, in final publication by a majority decision of the Committee. It stated that: "It is the belief of this Committee that optimism rather than pessimism should dominate the attitude of the profession towards this problem. In most cases treatment should represent a combination of various co-ordinated measures of therapy rather than a single procedure . . . under such circumstances an attitude of optimism toward the control of the problem is justified." This prophetic utterance was just twenty years before its time.

One of the most important decisions of their Committee was to hold an annual conference and exhibition on arthritis, in conjunction with the annual conventions of the American Medical Association. The first was held in Detroit in 1930, and the second in Philadelphia, when the collection of osteology in the College of Physicians of Philadelphia was used, and attracted much attention. In this way many important problems were appreciated for the first time and attacked with vigour and intelligence, including the need for better knowledge concerning the basic physiology of normal articular tissues. Much discussion took place on nomenclature and classification, and it was eventually agreed to adopt the use of the terms "atrophic" and "hypertrophic" as synonyms for the British terms "rheumatoid" and "osteoarthritic"—perhaps this was just a harmless symptom of nationalism?

One of the first acts of the new committee was to organise a public gathering: "A Conference on Rheumatic Diseases—An Open Meeting," which was chaired by Pemberton immediately prior to the annual A.M.A. meeting in New Orleans in 1932, and again the following year. These meetings caught the imagination of the medical profession and did much to spread the gospel of rheumatism. They were soon copied by other groups—the sincerest form of flattery.

Pemberton and Osgood, who seemed to have borne the heat and burden of these early days, were much praised for their interest and enlightened enthusiasm as well as for their proven competence in practice; but like all success stories this approval had by 1935 bred an equal and opposite disapproval, which led to both of these pioneers being passed over for the first presidency of the newly founded "*Association for Study and Control of Rheumatic Diseases*"; although Pemberton was elected three years later, but Osgood never. Dr. Ernest E. Irons, (who later became President of the A.M.A.), was elected president, and the membership soon reached 150.

In 1937 Hench inaugurated his famous *Annual Rheumatism Reviews*, published in the *Annals of Internal Medicine*, and later carried on by William D. Robinson, and now by Charley Smyth. These reviews were a great tribute to the energy, learning and administrative capacity of Hench, who took the major part in the production of the first nine of these outstanding contributions to our subject. He was much helped by many of those present today, especially perhaps Currier McEwen, Charles Ragan, Ralph Boots, George Dawson, and Loring Swain.

Our knowledge of rheumatic fever was also being increased during this period by the important work of such men as Homer Swift, Almon Coburn, Russell Cecil and J. C. Small, the search being principally for the infective seed or germ. In rheumatoid arthritis also, the infective theory still held sway and "specific" vaccines and artificial fever were the accepted basis of therapy, together with spa treatment for those who could afford it. Nonetheless it is interesting, in the light of present knowledge, to read a passage from a review article written by Hench in 1935. He said: "The sudden remissions induced by natural jaundice seem to permit the hope that rheumatoid arthritis need not forever be so relentless and irreversible a process, and that a way may be found whereby a rapid and similarly dramatic cessation of the disease's activity may be accomplished at will". Thus it seems evident that even at this time he was thinking along those hitherto unexplored lines which led him to the Nobel Prize in Physiology and Medicine in 1950.

American rheumatology at that time—and perhaps still—concerned itself rather exclusively with rheumatoid arthritis. Curiously little attention has ever been paid to the various non-articular syndromes and osteoarthritis; whilst ankylosing spondylitis is still only, rather painfully, emerging from its rheumatoid 'hide-out'. Gout was being rediscovered in America. Hench wrote in 1936 on "Gout, the forgotten disease of America", saying: "Unfortunately this disease has not disappeared—merely the awareness of it". Gold was only beginning to be used in the treatment of rheumatoid arthritis: Cecil, indeed, declared in 1937 that, "this is the decade of artificial fever and specific vaccines".

It was only in 1948 that money in any quantity became available for research in rheumatology. This resulted from the foundation by Paul Holbrook, Walter Bauer, Richard Freyberg and others of the *Arthritis and Rheumatism Foundation*, of which he became president—a great landmark in American rheumatology. This was also the year in which Rose described his famous test for the rheumatoid factor; the work of the Columbia University group which followed this advance marked the beginning of the present era of research and wider interest in immunity and auto-immunity in this field of medicine. Karl Meyer's work at the same institution indicates the present intense activity in the sphere of the chemical behavior of connective tissues.

Had there been no World War II, the International Ligue had planned to have held their first American International Congress in New York, in 1940. This had to be postponed, however, until 1949—the year of Dr. Pemberton's death from a coronary occlusion at the age of 71. At that Congress, 600 physicians for 32 countries attended. I shall never forget the dramatic session at which Hench, Kendall, Slocumb and Polly announced their great discovery of the effects of cortisone, and introduced certain grateful but somewhat euphoric patients onto the stage to confirm the effects of their research.

It was in 1953 that the first of those Interim Scientific Sessions, which occur annually at the National Institutes of Health at Bethesda, Maryland, was held under the inspiration of Dr. Joseph Bunim, and these meetings have continued to please and stimulate workers in our field all over the world to this day. These interim sessions are held under the auspices of the National Institute of Arthritis and Metabolic Diseases.

To conclude on a more controversial note, if I were to be asked to state "off the cuff" what seem to me to have been the recent defects and highlights in American rheumatology, I think I would mention amongst the former the rather undue specialisation of attention on rheumatoid arthritis—at any rate until Bunim's beautiful bit of work on Alkaptonuria and Ochronosis (in which he found the basis for this disorder of metabolism to be in the absence of just one liver enzyme) which aroused interest in a wider field. Then there was Nugent and Tyler's confirmation, in 1959, of the old impression that there is a renal

as well as a metabolic defect at work in gout, which was also a real advance in our thinking.

I would venture to deplore the obstinacy with which some of your eminent clinicians have clung to the bastard term "rheumatoid spondylitis", and so rendered several otherwise valuable collections of statistics useless. You in America also seem to some of us somewhat to have neglected morbid anatomical studies until recently. I think it is largely in the United States, however, that the renaissance in orthopaedic interest, particularly in the surgical management of the rheumatoid hand, has arisen and flourished.

You North Americans were the first to study the natural history of the untreated disease, and to introduce the concept of "stress"; although I think that we Britishers early established a lead in the matter of controlled trials and population surveys.

Of the discovery of cortisone I have already spoken; but I would like to refer to its local use by injection into joints, which has proved such a powerful therapeutic weapon, largely as the result of the work done in the University of Pennsylvania by your President and my friend, Dr. Joseph Lee Hollander. This must have put a number of physical therapy departments out of work!

As I have said earlier you in America have raised general interest, and so financial support, for rheumatology, in a much bigger way than anywhere else, and there must now be a well-equipped and enthusiastic team of high-grade medical scientists working in almost every important university centre in America. Rheumatology is no longer treated as the Cinderella of medicine, but has emerged as a leading clinical group within general medicine and is attracting bright recruits to its service increasingly. This new order of full-time workers has produced a new approach to the rheumatic diseases. My guess is that it will be you who will ultimately solve most of our age-old problems.

Extinct Medical Schools of Nineteenth Century Philadelphia:

(IV) Penn Medical University

By HAROLD J. ABRAHAMS, PH.D.

WE NOW direct our attention to the schools of eclectic character.

Dr. Joseph S. Longshore, who had been active in the temperance movement in Bucks County, Pennsylvania, and practicing medicine at Attleborough there, had become persuaded of the necessity of establishing facilities for the education of women physicians. With the help of James Flowers, to whom he gave strong assistance in being elected to the Legislature, he obtained a charter on March 11, 1850, for "The Female Medical College of Pennsylvania."[1] To support this and other schools, "The American Female Medical Educational Society" was organized. Among the friends of this society there were numbered such persons as Lucretia Mott, Horace Mann, and others of prominence.

However, schools operated exclusively for women soon came to be regarded as little better than boarding schools and their graduates not regarded so highly as had been hoped for. In addition, dissensions among the Faculty arose, and therefore a new charter for a school to be known as "The Penn Medical College"[2] was applied for and granted on February 2d, 1853.

The first "Announcement" (1853) quotes Lugol, Magendie, Wakley, Rush, Frank and others on the deficiencies of the art of medicine, ending with a quotation from Dr. James Johnson, editor of the *London Medical and Chirurgical Review*, that it is his "conscientious opinion, founded on long observation and reflection, that if there were not a single physician, surgeon, etc., there would be less mortality than now prevails." Thus the founders asked if "some radical change in the teachings of the schools is imperatively demanded? a change which shall make the practice of medicine more rational and philosophical, and therefore more successful?" Reasons for resistance to new ideas are discussed, then the statement made that "one of the objects of the Penn Medical College is the investigation of new doctrines." The watchwords were to be "fearless and free investigation," and "Progress." As schoolmen have so often been the last to admit that errors in religion and in philosophy were being taught in universities and schools, the same might be suspected as true in the teachings of medical schools.[3] Teachers of any science should no longer be permitted to:

[1] The present Woman's Medical College of Pennsylvania, Philadelphia—its name since 1867.

[2] The term "medical university" is an educational monstrosity, the accepted meaning of a "university" being, of course, a college plus its associated graduate and/or professional schools. The charter was issued to the "Penn Medical College." On January 14, 1854, before its first year had drawn to a close, the word "college" was, by decree of the Court of Quarter Sessions, replaced by "university," in order to render its title "more expressive of the peculiarity of the medical teachings of the institution," and thus be enabled to present "all the various theories taught by the leaders of the several schools of medicine." (Similarly, Philadelphia "University" of Medicine and American "University" of Philadelphia).

[3] Another reason given for starting one more medical school in Philadelphia was that other schools expect a beginner to enter upon his collegiate studies by commencing on the same day both the most elementary and the highest branches of medical science, and he must master the latter while becoming initiated in the former. "Who would introduce a tyro in education simultaneously to the alphabet and to Euclid's elements?" At Penn Medical the plan adopted "is a beautifully progressive one, commencing with the most elementary branches, and gradually advancing step by step, higher and higher. . . ." In 1858 the Faculty expressed its gratification at the fact that the American Medical

"Creep
Profoundly trifling—profitlessly deep,—
Treading the steps their sires before them trod,
The past their Heaven,—Antiquity their God!"

Hitherto the human body has been studied in the United States, in the dissecting room, while its debris, in every stage of corruption, has been subjected to chemical analysis. This Faculty believes in the unity of all disease, as characterized by "intermittency" and "periodicity"—as suggested by HIPPOCRATES, twenty three centuries ago. The Faculty stands on the principle of the "unity and integrity of the living body, the intermittency and periodicity of its functions, and the intermittency, periodicity and changes of temperature which mark the revolutions of universal nature. Time or Period (Chronos) and Temperature or Heat (Therma) are elements of every system of nature," yet nowhere is such a system of medicine taught in the schools. However, such a system does exist and was developed by that "mastermind, Samuel Dickson, of London". First announced in 1829, and published in 1836, it

> "... acknowledges every power and principle in creation, and avails itself of all natural means in the treatment of disease ... employs little medicine, saves an immense amount of suffering, greatly shortens the duration of disease and effects an unparalleled reduction in the number of deaths ... the bleeding-lancet, the leech and every other form of blood-letting is rejected ..."

The claim is made that many authorities now attest to the truth of the doctrine of the periodicity of health and disease. The statement in the Announcement concludes with the promise that the Penn Medical Faculty, having tested the doctrines of Dickson, now plans to establish a clinique where this "philosophical and rational system" may be taught, not, however, rejecting any well-founded principle that now has a place in the practice of medicine. (This is the basis for the belief that this school was founded for the purpose of teaching Dickson's doctrines). The Faculty is committed to the "universality of medical science", and will continue to investigate, promote and preserve any worth-while findings, feeling itself to be bound by no pathy, ism or system[4], but to the gathering

> "... from each of them, that which science approves and which experience demonstrates to be worthy of attention, giving prominence, however, to the doctrines of the unity, periodicity, and intermittency of all diseases ...",

resulting in principles of a simple and rational practice, scientific and successful. Only useless bleeding and the resort to mercurials will be rejected.

We have discussed above some of the elements which permeate the philosophy of medicine of the eclectic school. An additional distinction between the views of the Penn Medical University and all the medical schools discussed earlier in this series consisted in the fact that this school admitted female students on a basis of equal availability and honors. However, "in obedience to the dictates of propriety", the Spring term of 1853 was for male students only and the Fall term of 1853 for female students only. (The term "co-ordinate education" has been applied to the type of organization in which instruction is carried on for men and women in the same building, but at different hours, thus distinguishing it from true co-education, in which both sexes attend classes in the same room at

Association had approved of the main features of the progressive system of teaching, first announced by Penn Medical, and recommended it for general adoption by other schools. The system was also now advocated by leading medical journals, claimed this school.

[4] Hardly consistent with the statement of acceptance of the system of Dickson. (It may be worth noting here that Charles Creighton, in the D.N.B., describes Dickson as having been a writer "often instructive, both in theory and practice, here and there truly profound, and always lively and entertaining in style." He very early and most vigorously opposed the practice of bloodletting).

the same time. See, also, the concluding paragraph of footnote 5).

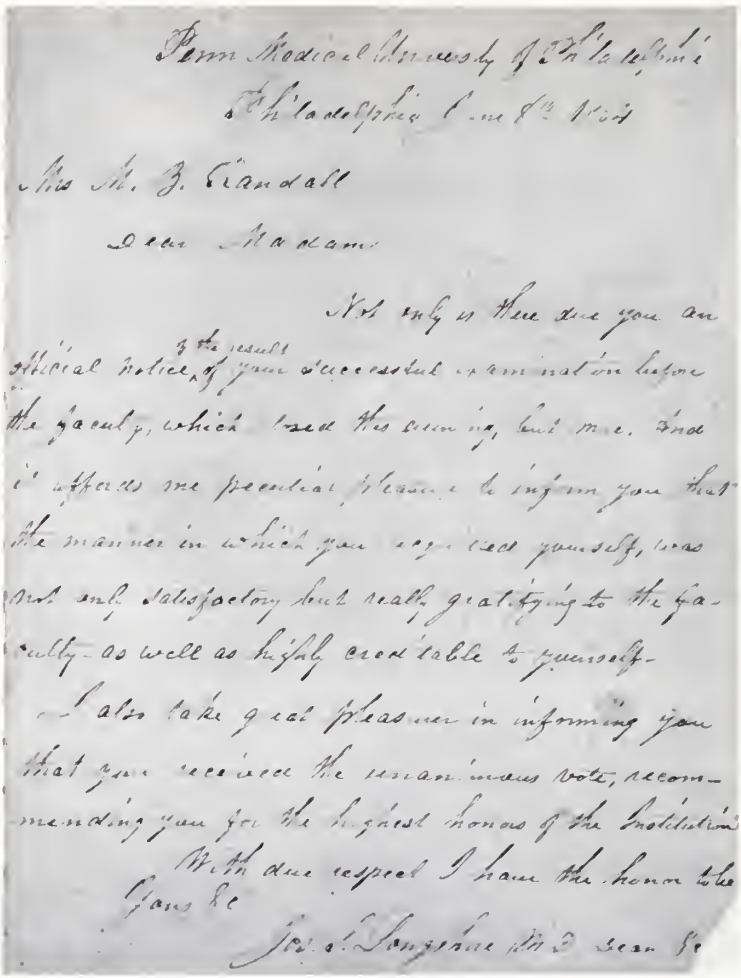
Starting with the conviction that woman's right to a place in the profession was now regarded by thinking persons as axiomatic, the question which remained to be answered was how best to organize a school to provide the training. A sense of propriety and delicacy causes us to oppose mixed or co-educational classes. On the other hand, a school organized for female students only, would be dismissed as being "only a female school," fit for teaching only what was sufficient for a woman practitioner. This medical school therefore undertakes to offer women a medical education which will meet with the approbation alike of students, the profession, and the public. (The term "Ladies' Institute of Penn Medical University" now makes its appearance in the Announcements).[5] In establishing this female department, the University feels that it has the moral support of "several high-toned medical journals," the State Medical Society of Pennsylvania and the public voice of America. Ignorance of physiology and medicine disqualify most women from their high duties as wives and mothers, and for their battle against infant mortality, half of mankind's chronic maladies and most of the diseases of womankind. This ignorance results in favoring the nostrums of the imposter, and in opposing the scientific efforts of the physician.

From the days of Panakeia and Hygieia, renowned daughters of Asklepios, of ancient Greece, to the times of Mesdames La Chapelle and Boivin in France many women have achieved high distinction, not to mention many successful practitioners in our own country. Medical schools for women were first established here, and a school now exists equal to those exclusively for men, where women's minds may become emancipated by obtaining a full medical education on a par with that for men. Medical education at this College is based upon a thorough grounding in the physical sciences, both theoretical and practical, with no respect for sectarian tendencies or exclusive dogmata. Women are offered any degree of completeness of education in medicine which they may desire—a single course in anatomy, botany, chemistry, etc., or full training, leading to the same professional honors available to male students. This is the same practice as that of the European schools. Most women physicians will probably work in the field of obstetrics and diseases of women and children. The University does not look for large enrollments of females in the full course, but it is hoped that many young ladies will complete their general education by taking one or more courses at this Ladies' Institute. (Fig. 1). Female Students attend no more than

[5] The Announcement for 1857–58 points out that no human enterprise is more appropriate for women than the art of healing, to which their whole nature is so well suited—i.e. bringing comfort and solace to a suffering world. Woman not only nurses and educates the newly-born man, but also hovers around him even to the grave. The medical profession owes, as a duty, to womankind the opportunity for this sex to acquire medical knowledge, so that future generations may enjoy good health. To ladies who feel a call to work in the cause of Foreign Missions a medical education will be of great value—as medical healers they can be admitted to the harems of the East, inaccessible to Christian men, and while ministering to the sick, also take the occasion of administering the Consolation of the Gospel, the light of whose truths can be made to shine on the benighted minds of the other sex. Thus a missionary woman can be both "a moral and religious instructor, and a scientific physician." Another argument is advanced in the Announcement for the following years—viz, the profession of medicine offers women a "larger field for honorable and profitable employment:"

> "While so many thousands of women are languishing in hopeless penury, compelled to follow uncongenial and profitless occupations, constantly exposed to the allurements of vice and crime, barely able, with the utmost exertion, to supply the absolute necessities of life, any scheme that promises to enlarge the area of female usefulness, and afford a corresponding remuneration, should be haled as a blessing. . . ."

By this date the sexes were attending classes during the same sessions, but were only segregated during some lectures, in order to avoid certain embarrassments in discussion and demonstration. Teachers and Courses were the same for both sexes, the only medical school in the country so organized, and it was felt that no other plan could produce properly educated women physicians.



Penn Medical University of Philadelphia
Philadelphia June 8th 1863

Miss M. J. Crandall

Dear Madame

It is only a few days since you received official notice of the result of your successful examination before the faculty, which I trust has come to hand. And it affords me peculiar pleasure to inform you that the manner in which you acquitted yourself, was not only satisfactory, but really gratifying to the faculty as well as highly creditable to yourself.

I also take great pleasure in informing you that you received the unanimous vote, recommending you for the highest honors of the Institution.

With due respect I have the honor to be

Yours &c

Jos. S. Longshore M.D. Dean &c

FIG. 1. The Penn Medical University, Philadelphia, as the above letter from its Dean attests, was an enthusiastic pioneer in the movement favoring medical co-education and the acceptance of women medical graduates as practitioners. (Reproduced from a photocopy presented, in 1943, to the library of The College of Physicians of Philadelphia by William Pepper, M.D., owner of the original letter.)

four lectures a day, with an equal number of hours of practical exercises, making for an easy yet profound, progressive, varied and leisurely education. Among the many subjects, interesting and instructive to ladies, but rarely taught in other schools, are mental philosophy, botany, natural philosophy, organic chemistry, microscopical anatomy, history of medicine, etc. The Faculty is the same for both men and women, except in practical anatomy, which will have a female demonstrator.

In 1862, with the Civil War in full violence, the University expressed its gratification that, despite the "depression existing in the political and financial affairs of the country," the college continued to prosper while "other kindred institutions around have fallen in ruins." The prominent views of all the different great medical theorists continued to be taught, but there was no denunciation of, or prejudice against, any theories under the cloak of saying that these violated medical ethics, or professional dignity. Happily too, the fact that the University's system of education is good is attested by the report that every graduate who

has appeared before the Army Medical Board for examination for appointment as surgeon, (about 12% of the Alumni) has been accepted into the Medical Staff of the Army. Women graduates likewise are meeting with success. (Some of the ladies living in the West were later delegated to the American Medical Association meeting at Philadelphia in 1876.)

In 1864, there now being 74 women and 127 men graduates, the University, "yielding to the demands of the country," gave up a large portion of its professors to the military service and suspended its work, additional considerations being that the lease of the building had expired and that Dr. Longshore, the head of the school, was severely ill. A class of thirty students had gathered together. Arrangements for educating these in other schools were made. Then the "furniture" was sold.

(William Paine, M.D., Dean of The Eclectic Medical College of Philadelphia, and editor of *The Eclectic Medical Journal of Philadelphia*, states that his college has purchased the Penn Medical University, and that the school resulting from the union of the two earlier ones will now confer upon its graduates the degree of whichever college they elect to receive, or both degrees, if so desired—see editorial, Volume 7, December, 1864, page 552. In 1865 the Legislature of Pennsylvania granted permission to style the new school "The Philadelphia University of Medicine and Surgery").

By the close of the war the Faculty was so scattered and reduced by illness, death, etc., that a new Faculty had to be assembled for the Penn Medical University. This could not be done until November, 1873, following a suspension of about seven years (from 1867 on). Drs. Joseph S. Longshore and E. D. Buckman organized a new Faculty, and in 1873 three students were enrolled, next year three permanent and two transient students attended, after which there were five in 1875, ten in 1876 and 1877, and twenty in 1878. The Announcements in these years were being issued in the name of "The Penn Medical University of Philadelphia." The original philosophy held sway—that of the universality of medical science, leaving none of the various "elements of medicine unexplored—retaining nothing because old, rejecting nothing because new", applying the most rigorous tests before approving, thus attaining a broad eclecticism.

In 1875 the University admitted the necessity under which the Faculty found itself of restating its principles in terms of pathogenetic doctrines, which caused it to place more emphasis upon the influence of food and temperature than did the profession at large. (The term "food" included everything, nutritious or poisonous, whether ingested, inhaled or absorbed. "Temperature" included the effects of clothing, climate, season or local applications affecting the circulation, and thereby health).

A monthly periodical "The Medical Scientist" was being planned, subscription to be $2.50 yearly, and the formation of an association of "Alumni, Faculty and other liberal members of the profession" was also being considered. The University wistfully expressed its lack of pretense that it could "vie with its older contemporaries in the size of their classes, the magnificence of their buildings, or the extravagance of their displays," but declared that its teachings were second to none in thoroughness, liberality and practical importance, and proudly laid claim to being the first in the world, in 1853, "to admit students, under legal authority, without discrimination as to sex, and irrespective of numerical proportion." It became extinct in 1881, having made a record as the pioneer both in co-ordinate medical education and in the progressive, or graded, curriculum.

I. BUILDINGS AND EQUIPMENT

In the first year, sessions were held in Franklin Hall, Sixth Street below Arch, in close proximity to a public square, where the neighborhood was regarded as one of the best in the city, and assured comfort, convenience and good health. The rooms were fitted with careful attention to the intended use. They were thoroughly ventilated and well supplied with gas and water. A front yard protected the

rooms against street disturbances and noises. There was a dissecting room, under the supervision of the professor of anatomy and the demonstrator, and dissecting material was abundant. There was also a museum, in which several members of the Faculty, who had taught for years in other medical schools, placed their personal collections of materials, thus assuring a liberal supply of all the needed means of instruction and illustration of every branch taught—manikins, models, drawings, wet and dried preparations, a powerful microscope, and other apparatus. The Faculty promised to secure "ample clinical instruction" in the college dispensary and to provide the opportunity for students to attend the "hospital practice of the city."

A location at Thirteenth and Arch Streets is mentioned for 1854.

In 1855 classes were held in a building located at 419 Market Street, West of Eleventh, where the museum was enriched with many wet and dried preparations and valuable dissections prepared by the professor of anatomy, who devoted his time exclusively to the cultivation of this subject. It was claimed that his labor and skill had produced items which were unsurpassed by the most celebrated anatomists and artists of the city. Likewise the professor of chemistry was active in building up the supply of chemicals and apparatus for instruction in his department, and no expense was spared in acquiring specimens for the department of materia medica. Models, diagrams, specimens, paintings and apparatus for the departments of surgery, obstetrics, physiology, etc., were also in abundance.

In 1857 classes were again held in a new home—this time at the northwest corner of Twelfth and Chestnut Streets. Equipment for this structure included a rich supply of "anatomical, physiological and microscopical diagrams mostly of German execution."

In the next year there was another home, this time at 910 Arch Street, and the equipment specified included all previous items, to which were added, for chemistry and natural philosophy, air and condensing pumps, electric, galvanic and (other) philosophical apparatus; for physiology, vivi-sections, tables, etc.; for pathology, pathological specimens; for surgery, bandages, splints, compresses, etc.; and for botany dried and recent specimens. Mention is made, in the Announcement for 1860 of the existence of a dispensary in this building,[6] for clinical instruction in medical, surgical and obstetrical cases and for compounding of prescriptions.[7] In 1862, with sessions still being held at 910 Arch Street, clinical instruction included the work of a dental department, where filing, filling, and extracting of teeth were done by, and demonstrated to the students. In addition, the Pennsylvania Lying-in and Foundling Hospital, newly chartered by the State would now furnish instruction to women students, while the clinic at Blockley Hospital would provide instruction for men students.

Its last home was located at 1131 Brown Street, "a high, airy and healthy locality, away from the din," where it resumed its educational operations upon its reorganization, in 1874. Here the museum collection was admittedly not large as compared with some of the older institutions, but it had many rare specimens. As to the college clinic, advanced students, when practical, were entrusted with clinic-patients at their homes.

II. CURRICULUM

In its first session the Penn Medical University offered a thirteen week term, justifying the brevity of the course by both a sense of conviction and a devotion to duty.

The Faculty was convinced that a rational and philosophical system of medicine could be fully developed in thirteen weeks, if princi-

[6] In that year it was determined, because of "the annually increasing size of the classes," to enlarge the building and improve ventilation and other comforts of lecture rooms.

[7] Students were permitted to compound prescriptions under supervision of the faculty, and suitable cases (medical and obstetrical) were placed under the special care of advanced students who visited such patients at their homes and "attended" them (with the help of the professors, if necessary).

ples were "separated from all speculative theories." Furthermore, they felt it a duty to avoid squandering the time and resources of their students, thus preventing protracted separation from the social restraints of home. The five-months session of established custom was wasteful, and called for reform, in view of the fact that as medicine became a more exact science the conflicting theories could be ignored and attention focused only upon sound principles, thus shortening the length of the sessions and allowing time for "other researches". The daily schedule for this Spring (male) session was as shown in Table 1.

The free time could be spent in attendance at the hospital or in study or review.

In the course on principles and practice the principles of the Chrono-Thermal doctrine were thoroughly illustrated by reference to cases without limit, and the extensive correspondence and reports from hospitals and Army and Navy Surgeons were drawn upon, to prove the superiority of the system being taught. In Materia Medica the natural and commercial history and modes of preparation and administration of medicinal agents were fully taught from the point of view of their thermal or electric action and the reasons for the diverse action of the same remedy, hitherto not explained by other teachers of this subject were given. New remedial agents, and new uses of older ones were introduced to the class. The fallacies of the theory of inflammation were exposed, in connection with the lecture on sedatives, blood-letting, etc., and calomel was shown no longer to be worthy of consideration as "the practitioner's most important remedial agent." Chemistry was taught with special reference to physiological applications and the findings of Liebig, Hoffman, Lehman and others. Toxicology, including the nature and modus operandi of poisons, analytical detection, antidotes and treatment of poisoning cases were dealt with from the chemical, medical and legal standpoints. Obstetrics was taught by one of the prime movers of the college, Dr. Joseph S. Longshore, who illustrated fully, utero-gestation with reference to its physiological conditions, and gave consideration to the philosophy and mechanism of parturition, natural and complicated foetal presentations, unassisted and assisted labors, obstetrical operations, anesthetics and their advantage in obstetrics and finally, diseases of women and children. Special mention is made of a perfect series of papier-maché models and an extensive series of human ova used as illustrative material. Surgery was covered in comprehensive fashion, the principal surgical operations being clearly and fully described; fractures, dislocations and deformities, and the various types of splints, bandages and other appliances were discussed and minor surgery in general was included in the course. The fundamental philosophy was that "the most able surgeon is he who cures without an operation"—he whose experience and skill so directed the "recuperative and reparative energies of the system, as to preserve the integrity of the whole, and restore it to health, retaining

TABLE 1

Hours	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9–10	Anatomy	Anatomy		Anatomy	Anatomy	
10–11	Principles and Practice	Principles and Practice	Hospital	Principles and Practice	Principles and Practice	Hospital
11–12	Obstetrics	Obstetrics	Hospital	Obstetrics	Obstetrics	Hospital
12–1	Materia Medica and Therapeutics	Materia Medica and Therapeutics	Medical and Surgical Clinique	Materia Medica and Therapeutics	Materia Medica and Therapeutics	Medical and Surgical Clinique
3–4	Physiology	Physiology		Physiology	Physiology	
4–5	Surgery	Surgery	Anatomy	Surgery	Surgery	Anatomy
5–6	Chemistry	Chemistry		Chemistry	Chemistry	

all of its parts." Anesthetics—their mode of use, quantity and special cases where indicated were discussed. The course in anatomy was complete, the demonstrations being supplemented by the use of natural preparations, models, magnified drawings, etc. "Enlarged apparatus" was used in teaching the complex structure of the eye and the ear, as well as general and minute anatomy. No student was to be allowed to graduate without having had at least one course in practical anatomy. Physiology and the Institutes of Medicine offered a full course of lectures on digestion, absorption, respiration, circulation, nutrition, and secretion, illustrating the normal functions of the human organism, as well as morbific, and minute development of animal structure. Medical Jurisprudence was treated in a series of lectures which do not seem to have been scheduled for any specific day or hour in the roster given above, but was so scheduled on the next term's roster. (It may seem strange to some eyes to read that additional lectures would be given by emeritus professors,[8] as stated in the College's very first announcement. In truth, the emeritus Professor Dickson of London was planning to visit the college in the Fall of 1853 and was expected to give "some valuable lectures.") The illustrative materials used in all of these courses have been mentioned above under "Buildings and Equipment."

Apparently the college did not have an auspicious start, its prospectus announcing the reduction of the first session to one of twelve weeks, and then only provided that a sufficient number of students should present themselves by a certain date (March 12, 1853). It was pointed out that students already in the city but at a distance from home could complete their studies and receive their college honors at this chartered institution, by extending their residence here for only three more months, because the increased number of daily lectures would compensate for the fact that other schools had a greater number of weeks to their sessions. Students who would be found qualified to graduate after one session at another college, plus attendance at the Spring session here would thus save time and money. Those who had had their second course (elsewhere) but were unwilling to risk an examination could take a third short, but complete course which would amply prepare them for graduation. Those who had failed to pass their examinations elsewhere and feared to return home without their honors, could avail themselves of the opportunity "for a more perfect preparation" by studying at Penn Medical for an additional three months and acquiring the degree before having to face their relatives and friends again. Students who planned to remain in the city during the time between their first and second sessions at other schools were asked to consider the advantages of enrolling in this spring session and profiting from this "double exposure." Finally, emphasis was placed upon the fact that this college offered an education in medicine at reduced costs, making possible a career in this profession to members of all social classes, if duly qualified, in addition to which the announcement encouraged Southerners to avail themselves of the teachings at Penn Medical because its instruction was "more in accordance with the views of Southern practitioners."

The Fall (female) session of the same year (1853) began as early as September 5th, in order that it could end before the inclement January weather would arrive. The term was now lengthened to sixteen weeks and its shortness justified by the arguments already set forth above. The daily schedule for this Fall session was as shown in Table 2.

With the emergence of the institution as a "university" in January, 1854, a new educational philosophy became manifest, resulting in curricular expansion. It was felt that this became necessary because of the rapidly developing exact sciences, which were carrying in their train a new era of precision and exactness for the medical profession. Basic knowledge

[8] Somehow reminiscent of the college which erected, on one of its lawns, a sign which read that it was traditional at that college that no one walk on the grass, the tradition to begin next Monday.

TABLE 2

Hours	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9–10	Practice	Practice	Practice	Practice	Practice	Medical Jurisprudence
10–11	Materia Medica	Materia Medica	Anatomy	Materia Medica	Materia Medica	Anatomy
11–12	Physiology	Physiology	Medical and Surgical Clinic	Physiology	Physiology	Chemistry
12–1	Chemistry	Chemistry	Medical and Surgical Clinic	Chemistry	Chemistry	Clinic
3–4	Surgery	Surgery	Chemistry	Surgery	Surgery	
4–5	Anatomy	Anatomy	Obstetrics	Anatomy	Anatomy	
5–6	Obstetrics	Obstetrics		Obstetrics		

was now expanding at such speed that, to take one example, what was formerly the chief and only positive science in medicine, descriptive anatomy, had now become but one of the five anatomical sciences, along with histology (or microscopical anatomy), comparative anatomy, surgical anatomy and pathological anatomy, all of which should be mastered by the truly scientific physician. Physiology too had become an extensive and dignified science, and chemistry, "the great lever of civilization of our age", had blossomed forth giving us the great study of organic chemistry, enabling us to penetrate the secrets of life processes in the forms of physiological chemistry, pathological chemistry, etc. Pathology was now a science, based upon the physical sciences, and these could guide the pathologist in tracing symptoms of a disease back step by step, from effect to cause, until he arrived at the original healthy state of the organism and the external cause which produced the first disturbance. Thus the laws of health and disease, like the other laws of nature, could be ascertained and an acquisition of this knowledge, based upon practical application of the physical sciences, would make a person a master of diagnosis. Materia medica, only twenty years earlier merely a rude collection of empirical remedies and requiring no special chair in a medical school, had expanded until it now deserved two or three chairs (i.e., botany, chemistry and materia medica). (Experience shows that, generally, the most substantial physicians are those who had first been practical apothecaries.) The same sort of remarks could be made about surgery, (which should be taught in progressive courses during at least two or three years), and obstetrics (embryology, both comparative and human, gynecology, etc.). The study of medical jurisprudence was inspiring and ennobling, teaching the young physician how high a place he held in the structure of society, the intellectual leadership expected of him, the confidence reposed in him, the esteem in which the public held him, and the progressive scholarship which he should constantly exhibit. The science of public hygiene provided a field in which he could be a public benefactor and protector without reference to personal rewards or motives. As the last two named studies were obligatory in every well organized medical school in Europe, so should they be in ours. Finally, the history of medicine, now rarely and fragmentarily taught in our medical schools, deserves a place in the curriculum because it throws light on our present state of science, for the dignity it lends to the physician who deals with erudite persons, in whose presence he should never display an ignorance of the history of his own profession, and because it is a shield against

the many current fallacies, bigotries, and intolerances. The principal specialties (ophthalmology, otology, dermatology) belong to the sphere of practice of the general physician, yet most physicians are not able to treat common diseases of the eyes, ears, skin, etc. Large cities have specialists, but what of the country at large? Our physicians who desire to attain the level of medical education which is only the common standard in the best European schools, must go abroad to carry on further studies, the while they feel the humiliation of discovering empty gaps in their training, despite their being graduates in medicine—a very lamentable *testimonium paupertatis* of our schools.

Two reasons, given for failure of medical schools to keep pace with the general progress of our country are, first, the disinclination of students to devote more time and means to study in antiquated organizations than is now required, so that lengthening the course would place a school in jeopardy of financial loss or even having to close, for lack of students; secondly, over-protection of students against too many abstruse studies, additional costs, and the loss of the comforts of home. The results of failure to reorganize our system of medical education are that the best health interests of millions of Americans are ignored and that our schools are not much better than when the first schools were in their infancy. The National Medical Convention has repeatedly called for lengthening the period of medical studies and some schools have, to a degree, responded. But the very system needs to be changed. In the days when medicine was looked upon as a trade or art, to be learned as a trade or art by apprenticeship under a practicing physician, it may have been in harmony with the low view of the profession to teach the theory of the empirical art by exposure to four or five months of lectures. Even so, it was absurd to teach all the branches simultaneously, the subjects which require preliminary foundations at the same time as the preliminary studies themselves—viz, the study of anatomy, practice of medicine, surgery and midwifery are all begun on the same day. It may have been excusable to do so when our country was in its infancy, a scientific education in medicine considered more a matter of ornament than a basis for practice, and collateral branches except descriptive anatomy were more speculative and visionary than demonstrable. Today medicine in the most civilized countries has grown into a great cycle of at least ten or twelve positive or exact sciences, each comprising a number of subordinate sciences. Our country has equalled other lands in all other phases of civilization and our citizens deserve in every way, the best medical care. Yet our antiquated and irrationally organized schools graduate thousands of superficially educated physicians, no more adequate for their profession "than a sailor who has made one trip to Europe on board a packet, would be fitted to the command of an ocean steamer." (There are of course honorable exceptions, but these young graduates are so qualified in spite of our miserably organized medical schools. We also have some excellent physicians, who became proficient because of additional study in Europe.)

It is misleading to say that students attend two courses of lectures in order to qualify for the final examination, because the second course is nothing more than a repetition of the first, verbatim and literatim. The second course is a parroting of the first course, containing nothing new for the student and is thus insulting to the intelligence, boring, and wasteful of time. It would be far better to devote the second year to advanced studies.

The Penn Medical University, therefore proposes to organize medical education in a form worthy of our age and country and, if supported, will continue to institute such radical reforms as will bring it into favorable comparison with the best European schools. The curriculum of lectures will comprise four progressive or graded courses, each of four months duration, two courses to be given per year (first day of October until last day of January and first day of March until the last day of June). The obligatory cycle of courses

will then consist of courses I and II in the first year and courses III and IV in the second year. Since the first year and second year courses will be running simultaneously each Fall and Spring, a student will be able to take some first year review courses while enrolled in his second year studies, and a person who has completed all four sessions (two years) may, in an additional (third) year take all four theoretical courses over again. In such a program he will have time for the acquisition of a detailed and practical knowledge of such elementary branches as anatomy, histology, natural philosophy (physics), inorganic chemistry, botany, etc., and, upon the basis of this knowledge proceed to acquire a knowledge of the somewhat higher branches—organic chemistry, physiology, surgical anatomy, medical botany and so on.

CURRICULUM OF THE COURSES AND LECTURES, ETC., HELD AT THE PENN MEDICAL UNIVERSITY OF PHILADELPHIA

I. First or Philosophical Course

From October 1 to February 1

1. Descriptive Anatomy
2. Microscopical Anatomy
3. Inorganic Chemistry
4. Natural Philosophy
5. General Botany
6. Mental Philosophy
   Practical Anatomy
   Practical Chemistry
   Practical Botany

II. Second or Physiological Course

From March 1 to July 1

7. Surgical Anatomy
8. Physiology
9. Organic Chemistry
10. Medical Chemistry
11. Medical Botany
12. History of Medicine
    Practical Anatomy
    Practical Chemistry
    Practical Botany

III. Third or Pathological Course

From October 1 to February 1

13. General and Special Pathology
14. Materia Medica
15. Obstetrical Anatomy, Physiology and Pathology
16. Surgical Pathology and Minor Surgery
17. Institutes of Medicine and General Therapeutics.
18. Medical Jurisprudence
    Clinics
    Pathological Museum
    Autopsies

IV. Fourth or Practical Course

From March 1 to July 1

19. Morbid Anatomy and Chemistry
    Diagnostics
20. Pharmacy
21. Operative Obstetrics and Treatment of Diseases of Women and Children
22. Operative Surgery and Specialties
23. Practice of Medicine
24. Public Hygiene
    Clinics
    Hospitals
    Autopsies

Frederick C. Waite, in his "Medical Education of Women at Penn Medical University", (*Medical Review of Reviews*, June, 1933, page 259), states that "this progressive education continued to be carried out" for some years. This approach to a graded curriculum recalls the somewhat graded series of courses offered by the Philadelphia College of Medicine (*Transactions & Studies of the College of Physicians of Philadelphia*, 4th s., *30:* 165, Jan., 1963) and should be compared also with that offered a little later by the Philadelphia University of Medicine and Surgery, to be considered in number six of this series.

Not stipulated in the table above are the following: experiments in natural philosophy, field trips in botany, practical applications in mental philosophy (logic), experiments and vivisections in physiology, analysis in organic chemistry, laboratory work in medical chem-

istry and in pharmacy, medical literature in connection with history of medicine. These are mentioned in the 1855 pamphlet discussed below, which pointed out that no other medical school in the city taught general and medical botany as a distinct branch, nor was natural philosophy given a "separate position," except at this school, where its relation to anatomy, physiology, chemistry, pathology, surgery, and obstetrics were given attention and illustrated by numerous experiments; mental philosophy was included in order to compensate for the prevalent lack of logic, the want of which constantly caused the perpetration of "fatal blunders, inconsistencies and absurdities", by acknowledged members of the profession; general and special pathology, not accorded the dignity of a distinct professorship by any other school in this city, was illustrated by clinical demonstrations, post mortem examinations, etc.; in materia medica there were "occasional experiments upon the inferior animals" in order to illustrate the effects of medicines upon the animal economy; in the institutes of medicine, a fair and intellectual investigation of various sectarian doctrines was made, as a safeguard against the blind adoption of any exclusive dogma by the student; in practice of medicine emphasis was upon scientific method and procedures, and not on empyricism, sectarianism or promotion of any narrow creed; surgery was taught in four successive courses beginning with microscopic anatomy and progressing to the final course, operative surgery, including practical exercises on subjects and clinical demonstrations.

As may be seen from this table the first course deals with the fundamental or basic sciences, and is styled "philosophical," the second with the sciences applied to life and therefore called "physiological," the third with diseased or unusual conditions and therefore "pathological," and the fourth the practical sciences, hence the "practical" course. The degrees of progressive difficulty of the courses were felt to be obvious upon inspection.

The University was willing to accept, for advanced standing, those students who had completed one or two courses at another medical school, or would permit persons with two or three courses of lectures at other schools to their credit to attend all four courses in one year, or the fourth course alone at this school, and be graduated upon passing an examination, or, for the Spring session of 1854, students who had been under a preceptor for one year or otherwise gave evidence of their capacity for advanced work would be accepted into the second course, and permitted, while in the third course, later on, to make up for any deficiencies, by attending the principal lectures of the first course without payment of additional fees except those of the demonstrators.

The aim of the Faculty was toward the practical side, and avoidance of too great emphasis upon theory, four hours being devoted daily to lectures, and four hours daily to demonstrations in dissecting room, laboratory work, hospital, clinic, etc. In evidence of the devotion to the practical, the professor of botany made botanical excursions with his classes at suitable seasons and drew upon the botanical gardens of the vicinity. For the leisure hours of students there were a library and a reading room, where were to be found the principal medical periodicals of foreign countries and other interesting journals and newspapers. The attitude of the University was that rules must be enforced, but the welfare of the student was uppermost in its mind and it stood ready to make modifications if these would do no real violence to its aims, hoping that there would also be reciprocal considerateness on the part of the students.

For the student the leisurely pace was wholesome and the variation each day from theoretical mornings to practical afternoons was stimulating and interesting. In addition, he could, in three years, take all the courses (sixteen months) and have twenty months under a preceptor or in the hospitals. Classes were smaller because of the division into four

courses and the substitution of informal weekly conversations (between students and professors) for the humiliating quiz was a desirable change.

The University solicited the approbation of the whole medical profession for its reorganization plans, making no claim to be perfect, but stating that it was the best that could be done at present for the improvement of medical education.

Under the date of 1855 the University defended itself, in a pamphlet: "Remarks on the New System of Medical Education . . ." against the National Medical Convention's resolution criticizing medical schools which mingle exclusive systems, such as homeopathy, with "scientific medicine" in their institutions:

> "Woe unto our lofty temples of Esculapius,
> if the public at large understood the miserable
> farce transacted in them in manufacturing
> the guardians of the health of the nation!
> And woe unto the shallow aristocrats,
> and high bearing old fogies, who are so
> clamorous in upholding their antiquated
> absurdities . . . if medical students
> should once make use of . . . their American birthright
> to doubt and examine the title and authority
> which so far sways the destinies of physic
> in this country!"

The pamphlet reiterated that other schools give a mongrel mixture of lectures, and their students hurry over all the branches of their professional education simultaneously, irrespective of whether these studies rightly belong at the beginning, middle or completion of their studies. It found encouragement for its reforming zeal in the fact that Professor Stillé, of the Medical Department of Pennsylvania College, had offered, and the American Medical Association had recently adopted, at its convention in Philadelphia two resolutions, one establishing a special committee of five, which would report at the next meeting of the Association, on the advisability of modifying the current practice of repeating the same lectures to the same classes during two successive terms, and in its stead adopt a curricular organization approximating that of the Penn Medical University in many particulars, (i.e. so divided, extended and arranged) but embracing only branches that were usually taught in the medical schools of that day; the other resolution calling upon medical schools to give official expression of the merits of the plan. The Penn Medical University found this limited acceptance of its reforms "exceedingly gratifying". The American Medical Association approved of the main features of the school's instruction and recommended it for general adoption in the nation's medical schools, according to the announcement for 1858.

The announcement for 1857 states that, having in mind those graduates who will become country practitioners, the school has established a professorship of dental surgery for the study of teeth and gums, and general operative and mechanical dentistry.

By the year 1860, the University claimed its sessions to be of six full months length, eleven professors carrying on full teaching activities during the sessions.

Upon reopening, some years after the Civil War, both Faculty and curriculum were curtailed. The curriculum consisted of anatomy (general, special and surgical), physiology (including histology and microscopy), chemistry (theoretical, practical and toxicology), materia medica and therapeutics, pharmacy, hygiene, principles and practice of medicine (including pathology and clinic practice), obstetrics (and diseases of women and children), clinical obstetrics, principles and practice of surgery (operative, minor, and clinical). Previous office instruction under a preceptor was not a requirement for admission to the school, but preliminary instruction in natural philosophy, chemistry, materia medica, botany and pharmacy were regarded as very helpful, and if the student had not already received instruction in these subjects before enrolling at the school he was advised that such instruction could be obtained from the professors in the interim of the sessions. The school continued to be co-educational, reaffirming its belief that it was the first in the world

(1853) to "... unfurl the banner of medical co-education, and to admit students, under legal authority, without discrimination as to sex, and irrespective of numeral proportion....." It also continued to live by its faith in contributing to the process of checking the tendency toward fractional exclusiveness in medical education, and asserted that it was the first to recognize the universality of medical science—the entire art of healing—and that the philosophy underlying the teaching of this school was such that its success in practice warranted "its claim to a place far above the dominant systems of medicine, and, in proportion as it is understood [it] leads to positive results"!

In bringing this study of the curriculum of the Penn Medical University to a close it may be worthwhile to make the following observations:

1. Clinical instruction was given (two hours, semi-weekly), the opportunities for observation and instruction at the public hospitals of the city were called to the attention of students, and third course students were furnished cases in practice under the supervision of members of the Faculty, but no requirement of hospital attendance was stipulated for graduation. (The announcement for 1879 refers to three hours semi-weekly, in clinical instruction, at Blockley Hospital, without stating whether attendance was required.) It was felt that experience in the college dispensary and at the homes of patients, under supervision of the professors, resulted in acquiring practical knowledge not attainable in lecture rooms of hospitals nor in wards visited in common with multitudes of students, the few cases attended upon, studied and treated, with a sense of responsibility, in dispensary and home resulting in greater confidence and more practical knowledge on the part of the prospective physician than lectures at the hospitals.

2. The length of a session grew from that of a period of thirteen weeks, in the early life of the school, to a period of six calendar months in 1858.

REQUIREMENTS FOR GRADUATION

These were similar to requirements at other schools of the time: the candidate for the degree must be at least 21 years of age, have studied for two years under a respectable practitioner, attended at least two full courses of lectures, the last of which was at this college, and must have had at least one course in practical anatomy, including dissection of the principal parts of the human body; the candidate must submit a thesis, copies of which (it was stipulated in the year 1854 only) were to be distributed as follows: 25 to the library of the school, one each to the professors, demonstrators and trustees, ten to the library of the State of Pennsylvania, five to the Library of Congress and five to the Smithsonian Institution; the candidate must pass an examination, which, to avoid all mystery in conferring the highest honor of the profession, was to be held in public before the Board of Trustees and other professional and non-professional guests. (Later the examination was made private.) The requirement of two courses at first meant two courses, per year, for two years. Evidence of good moral character and a previous education of good quality were also stipulated. In later years it was required that the thesis be at least ten pages in length, and the courses required be anatomy, histology, principles and practice of medicine and surgery, obstetrics, diseases of women and children, physiology and microscopic anatomy, materia medica, therapeutics, chemistry and toxicology.

Graduates of other recognized schools could receive the degree ad eundem on payment of matriculation and graduation fees, while graduates of proscribed schools could win the M.D. degree upon passing an examination and the payment of $50. The Faculty felt that the reduced costs at their school would to a large extent do away with the evils of irregular practice by enabling persons now practicing medicine offensively to the profession to take this less costly training and become legal practitioners. When the school

was reorganized, in 1874, it offered any practitioner, who had engaged in general practice for five years and was in good standing in the community, the degree of doctor of medicine upon completion of one session and the passing of an examination.

Just before it became extinct the school required that an interval of at least five months elapse between the two required courses of lectures, and that each candidate for the degree deposit some specimen of his own preparing, which "illustrated the science of medicine," and was properly labelled, and also bore the name of the student and date of graduation.

III (A) FACULTY

Session of Spring, 1853

President, The Secretary of the Commonwealth, *ex officio*.

Vice-President, David Holmes, M.D., of Rhode Island.

Emeritus Professors

Samuel Dickson, M.D., of London, Professor of Principles and Practice of Medicine.

William Turner, M.D., of New York, Professor of Institutes of Medicine.

Faculty

Abraham Livezey, M.D., (Dean of the Faculty), Professor of Principles and Practice of Medicine.

J. Emerson Kent, M.D., Professor of Materia Medica and Therapeutics.

Seth Pancoast, M.D., Professor of Physiology and Institutes of Medicine.

Joseph S. Longshore, M.D., Professor of Obstetrics, and Diseases of Women and Children.

John Coleman, M.D., of New York, Professor of Principles and Practice of Surgery.

N. R. Moseley, M.D., Professor of Anatomy, General and Special.

Lawrence Reid, Esq., of New York, Professor of Chemistry and Toxicology.

Furman Sheppard, Esq., Professor of Medical Jurisprudence.

Female Session, Fall, 1853

Samuel Dickson, M.D., Professor Emeritus of Surgery and Practice of Medicine.

William Turner, M.D., Professor Emeritus of Pathology and Institutes of Medicine.

Abraham Livezey, M.D., Professor of Principles and Practice of Medicine and Surgery, and Dean.

J. Emerson Kent, M.D., Professor of Materia Medica and Therapeutics.

Joseph S. Longshore, M.D., Professor of Obstetrics, and Diseases of Women and Children.

Seth Pancoast, M.D., Professor of Anatomy, Physiology and Institutes of Medicine.

Furman Sheppard, Esq., M.D., Professor of Medical Jurisprudence.

T. Augustine M'Rean, M.D., Professor of Chemistry and Toxicology.

Mrs. Hannah E. Longshore, M.D., Demonstrator of Anatomy, &c., &c.

Session of Fall, 1854

A. R. Thomas, M.D., Professor, adj. of Descriptive and Surgical Anatomy.

Seth Pancoast, M.D., Professor of Microscopical Anatomy and Physiology.

J. M. Macomber, M.D., Professor of Inorganic and Organic Chemistry.

J. E. Kent, M.D., Professor of Natural Philosophy and Medical Chemistry.

S. Freedley, M.D., Professor of General and Medical Botany.

J. M. Macomber, M.D., Professor p. t. of Mental Philosophy and History of Medicine.

William Schmoele, M.D., Professor of Gen. and Spec. Pathology, Morbid Anatomy, and Dean.

J. C. Morgan, M.D., Professor of Materia Medica and Pharmacy.

J. Herzka, M.D., Professor of Institutes and Practice of Medicine.

J. C. Snodgrass, M.D., Professor, adj. of Institutes and Practice of Surgery.

Joseph S. Longshore, M.D., Professor of Institutes and Practice of Obstetrics.

Furman Sheppard, M.D., Professor of Medical Jurisprudence and Public Hygiene

A. R. Thomas, M.D.; Joseph Koerper, M.D., Demonstrators of Anatomy.

Benjamin Dowling, Demonstrator of Chemistry.

Sessions of Fall, 1855, and Spring, 1856

The Faculty was the same as that for 1854, except that F. Strube replaced Dr. Pancoast in microscopical anatomy and physiology, Dr. C. Kamerly replaced Dr. Snodgrass in institutes and practice of surgery, and Dr. Koerper was the only demonstrator of anatomy.

For the Female Session of Fall, 1855, and Spring, 1856, the Faculty differed from that of the Male Session only in that Dr. Hannah E. Longshore was demonstrator of anatomy.

Session of 1857–58—Male and Female Departments

Charles F. Hoffendal, M.D., Emeritus Professor of Principles and Practice of Medicine.

A. R. Thomas, M.D., Professor of Descriptive and Surgical Anatomy and Operative Surgery.

J. M. Macomber, M.D., Professor of Inorganic, Organic and Medical Chemistry and Natural Philosophy, and Dean, Male Department.

Samuel Freedley, M.D., Professor of General and Medical Botany.

J. Emerson Kent, M.D., Professor of Principles and Practice of Medicine.

William Schmoele, M.D., Professor of Gen. and Special Pathology, and History of Medicine.

Seth Pancoast, M.D., Professor of Microscopic Anatomy, Physiology, and the Institutes of Medicine.

John C. Hutton, M.D., Professor of Materia Medica, Pharmacy, and General Therapeutics.

Joseph S. Longshore, M.D., Professor of Institutes and Practice of Obstetrics, and Dean, Female Department.

Martin H. Andrews, M.D., Professor of Mental Philosophy, and Medical Jurisprudence.

Isaiah Lukens, M.D., Professor of Mechanical and Operative Dentistry.

Joseph F. Koerper, M.D., Demonstrator of Anatomy in the Male Department, and Prosector of Surgery.

Hannah E. Longshore, M.D., Demonstrator of Anatomy in the Female Department.

In the session of 1858, Dr. M. Beach was professor of institutes and practice of surgery, and Drs. Charles A. Leech and Jane V. Myers replaced Drs. Koerper and Longshore as demonstrators in anatomy, male and female departments, respectively. Dr. Hoffendal was no longer on the Faculty.

In 1859 the Faculty differed from that in 1857 in the following ways: Drs. Macomber, and Hutton were replaced by Drs. Edwin D. Buckman, and Thomas G. Rowand, respectively. Dr. Kent became Dean. Dr. Henry A. Daniels became professor of surgery and surgical anatomy. Drs. Beach, Koerper and Freedley were no longer on the Faculty.

Session of 1860–61

S. Pancoast, M.D., Emeritus Professor of Microscopic Anatomy and Physiology, and Dean.

Joseph S. Longshore, M.D., Professor of Obstetrics and Diseases of Women and Children.

J. Emerson Kent, M.D., Professor of Institutes and Practice of Medicine.

William Schmoele, M.D., Professor of General and Special Pathology, and History of Medicine.

A. R. Thomas, M.D., Professor of Anatomy.

Isaiah Lukens, M.D., Professor of Operative and Mechanical Dentistry.

C. A. Leech, M.D., Professor of Microscopic Anatomy and Physiology.

Edwin D. Buckman, M.D., Professor of Inorganic, Organic and Medical Chemistry, and Natural Philosophy.

Thomas G. Rowand, M.D., Professor of Materia Medica, Pharmacy, and General Therapeutics.

Marshal Calkins, M.D., Professor of Institutes of Surgery, and Surgical Diseases.

Walter Burnham, M.D., Professor of Operative Surgery.

A. De Kalb Tarr, M.D., Professor of Mental Philosophy and Medical Jurisprudence.

The announcement claimed Dr. Burnham as probably being unsurpassed in his field in America and as possessing a very enviable European reputation, and Dr. Tarr as engaged in both the practice of law and of medicine.

Session of 1862–63

The following changes were made in the 1860 faculty for this session: Drs. Kent, Rowand, Calkins and Burnham left. Dr. L. W. Buffington replaced Dr. Calkins in surgery, while Dr. G. S. F. Pfeiffer replaced Dr. Kent in theory and practice of medicine. Drs. Buckman and Leech also became lecturers on clinical practice in addition to their former duties, and Drs. Thomas and Buffington also lectured on clinical surgery. Dr. Lukens added lectures on clinical dentistry.

Session of 1874–75

Joseph S. Longshore, M.D., Professor of Obstetrics and Diseases of Women and Children.

H. J. Doucet, M.D., Professor of Theory and Practice of Medicine.

E. D. Buckman, M.D., Professor of Physiology and of Microscopic Anatomy, and Dean.

Isaac Rehn, M.D., Professor of Chemistry and Toxicology.

J. R. Holcombe, M.D., Professor of General and Special Anatomy.

William H. Blake, M.D., Professor of Materia Medica and Pharmacy, and Lecturer on Mental and Electro-Therapeutics.

James M. Buzzell, M.D., Professor of Surgery.

James D. Linton, M.D., Demonstrator of Anatomy.

Session of 1875–76

The faculty was the same as in 1874 except that E. Down, M.D., replaced H. J. Doucet, M.D. and that the duties of James D. Linton, M.D. were taken over by ("under the supervision of") the professor of anatomy.

Session of 1876–77

The only change in the 1875 faculty was the replacement of E. Down, M.D., by N. R. Lynch, M.D., in theory and practice. Clinical lecturers were Drs. Lynch, Daniel Rice, and Buckman. Demonstration of anatomy was again under the supervision of the professor of that subject.

Session of 1878–79

Joseph S. Longshore, M.D., Professor of Obstetrics and Diseases of Women and Children.

E. D. Buckman, M.D., Professor of Physiology, Microscopic Anatomy, and Temporarily of Surgery, and Dean.

William Bringhurst, M.D., Professor of Chemistry and Toxicology.

J. R. Holcombe, M.D., Professor of General and Special Anatomy.

William H. Blake, M.D., Professor of Medical, Mental and Electro-Therapeutics, and of Hygiene.

Professor of Surgery (name not announced)

N. R. Lynch, M.D., Professor of Theory and Practice of Medicine.

W. C. Buckley, M.D., Professor of Materia Medica and Pharmacy.

Demonstrators of Anatomy:

Male Department: William H. Welden, M.D.
Female Department: Susan Tobias, M.D.

Session of 1879–80

Joseph S. Longshore, M.D., Professor of Obstetrics and Diseases of Women and Children.

E. D. Buckman, M.D., Professor of Physiology, Histology and Microscopy, and Dean.

J. R. Holcombe, M.D., Professor of Anatomy, General, Special and Surgical.

W. H. Blake, M.D., Professor of Materia Medica and Therapeutics.

William Bringhurst, M.D., Professor of Chemistry, Theoretical and Practical, and Toxicology.

W. C. Buckley, M.D., Professor of the Principles and Practice of Medicine, and Pathology.

Alexander Eugene E. Falken, M.D., Professor of Principles and Practice of Surgery and Clinical Surgery.

T. B. Barnes, M.D., Professor of Pharmacy and Hygiene.

Demonstrators of Anatomy:

William H. Weldon, M.D., Male Department.

Susan Tobias, M.D., Female Department.

III. (B) ALPHABETIZED LIST OF MEMBERS OF THE FACULTY

(For Faculty grouped by year, see previous pages.)

Andrews, Martin H., M.D. '57–59
Barnes, T. B., M.D. '79
Beach, M., M.D. '58
Blake, William H., M.D. '74–79 inclusive
Bringhurst, William, M.D. '78–79 inclusive
Buckley, W. C., M.D. '78–79 inclusive
Buckman, Edwin D., M.D. '59–79 inclusive
Buffington, L. W., M.D. '62
Burnham, Walter, M.D. '60
Buzzell, James M., M.D. '74–76 inclusive
Calkins, Marshal, M.D. '60
Coleman, John, M.D. '53
Daniels, Henry A., M.D. '59
Dickson, Samuel, M.D. (emeritus) '53
Doucet, H. J., M.D. '74
Dowling, Benjamin '54
Down, E., M.D. '75
Falken, Alexander E. E., M.D. '79
Freedley, S., M.D. '54–58 inclusive
Herzka, J., M.D. '54–55 inclusive
Hoffendal, Charles F., M.D. '57
Holcombe, J. R., M.D. '74–79 inclusive
Hutton, John C., M.D. '57–58 inclusive
Kamerly, C., M.D. '55
Kent, J. Emerson, M.D. '53–60 inclusive
Koerper, Joseph F., M.D. '54–57 inclusive
Leech, Charles A., M.D. '58–62 inclusive
Linton, James D., M.D. '74
Livezey, Abraham, M.D. '53
Longshore, Mrs. Hannah E., M.D. '53–57 inclusive
Longshore, Joseph S., M.D. '53–79 inclusive[9, 10]
Lukens, Isaiah, M.D. '57–62 inclusive
Lynch, N. R., M.D. '76–78 inclusive
Macomber, J. M., M.D. '54–58 inclusive
M'Rean, T. Augustine, M.D. '53
Morgan, J. C., M.D. '54–55 inclusive
Moseley, N. R., M.D. '53
Myers, Jane V., M.D. '58
Pancoast, Seth, M.D. '53–54 inclusive[11]
Pfeiffer, G. S. F., M.D. '62

[9] It should be borne in mind that the school held no sessions for a period of years from mid-Civil War times until the year 1874. For the announcements which could not be studied because unavailable, see "Bibliography."

[10] Joseph S. Longshore's rôle in the founding of the Penn Medical University has been mentioned earlier in this study. His constant and unwavering devotion, both to the University and to the cause of medical education of women, is worthy of note.

Dr. Longshore was blessed with a keen and logical mind, in addition to which both his good earlier education and his splendid medical training gave him marked erudition, from which grew his excellence as a public speaker and teacher. His enforced use of a cane, due to a boyhood injury, did not prevent his becoming a successful practitioner early in his career. He was the author of "The Philadelphia System of Obstetrics, in Twelve Parts, Fully Illustrated . . . (etc.), 1868, 800 pp., "The Principles of Nursing", etc.

[11] Seth Pancoast was professor of anatomy in 1853 at the Female Medical College of Pennsylvania, and shortly thereafter held a similar post at Penn Medical University. After teaching and practicing for only six years he became interested in mysticism, developing into a noted scholar in cabalistic literature and building up what was probably the largest collection of books on the occult sciences ever assembled in the Western Hemisphere. His co-mingling of cabalistic ideas with medical and scientific knowledge led to his writing some extraordinary books: *The Kabala or True Science of Light* . . . etc. (1877), said to be the first book ever written in English which attempted to give a mystical interpretation of the Holy Scriptures. *Blue and Red Light or Light and Its Rays as Medicine. . . . How to Apply the Red and Blue Rays in Curing the Sick and Feeble* (1877). This is not a work on therapeutics, but rather a mixture of mysticism, science, religion and medicine, incomprehensible to an average modern reader. He also wrote: *An Original Treatise on the Curability of Consumption by Medical Inhalation and Adjunct Remedies* (1855); *Onanism-Spermatorrhea* (1858); *Porneio-Kalogynomia-Pathology* (1858); *Ladies' Medical Guide and Marriage Friend* (1859), which had two later editions; *The Cholera, Its History, Cause, Symptoms and Treatment* (1873).

Rehn, Isaac, M.D. '74–76 inclusive
Reid, Lawrence, Esq. '53
Rice, Daniel, M.D. '76
Rowand, Thomas G., M.D. '60–61 inclusive
Schmoele, William, M.D. '54–62 inclusive
Sheppard, Furman, Esq., M.D. '53–56 inclusive
Snodgrass, J. C., M.D. '54
Strube, F., M.D. '55
Tarr, A. De Kalb, M.D. '60–62 inclusive
Thomas, A. R., M.D. '54–62 inclusive[12]
Tobias, Susan, M.D. '78–79 inclusive
Turner, William, M.D. (emeritus) '53
Welden, William H., M.D. '78–79 inclusive

IV. TEXTBOOKS USED

(The first listing of the textbooks used occurs in the announcement for 1860.)

1860

Anatomy—Wilson, Quain and Sharpey.
Physiology—Carpenter and Kirkes.
Chemistry—Silliman and Fownes.
Pathology—Williams
Obstetrics—Cazeaux and Ramsbotham.
Diseases of Women—Churchill.
Practice of Medicine—Elliotson and King.
Surgery—Erichsen, Druitt and Cooper.
Dentistry—Harris.
Medical Jurisprudence—Taylor, Wharton and Stillé.

[12] Amos Russell Thomas gave up a career as a business-man to pursue the study of medicine after becoming fascinated by his study of an Indian skull. He was professor of anatomy at Penn Medical University and lectured on artistic anatomy at the Academy of the Fine Arts of Philadelphia and the Philadelphia School of Design for Women during the same period. After his service as a surgeon in the Civil War he became professor of anatomy at Hahnemann Medical College, later becoming dean. He wrote: *A Practical Guide for Making Post-Mortem Examinations . . . with Directions for Embalming the Dead and for the Preservation of Specimens* . . . etc. (1873); *Diseases of the Pancreas* . . . etc. (1882), in collaboration with others; *A New Preparation for the Nervous System,* (containing a description of a unique dissection of the entire nervous system in the museum at Hahnemann Medical College); *History of Anatomy* (1893). He also wrote numerous papers for homoeopathic journals, and was editor of the *American Journal of Homoeopathic Materia Medica* and president of the Homoeopathic Medical Society of Pennsylvania (1887).

Materia Medica—Mitchell.
Pharmacy, U.S. Dispensatory—Pereira
Homeopathic Materia Medica—Hemphill.

1862

Anatomy—Wilson, Quain and Sharpey.
Physiology—Carpenter, Draper, Kirkes.
Chemistry—Fownes, Turner, Silliman.
Materia Medica—Wood & Bache's Dispensatory, Pereira's, Coe's, Hemphill's.
Surgery—Smith's, Druitt's, Gross'.
Obstetrics—Cazeaux, Ramsbotham, Velpeau.
Medical Jurisprudence—Beck.
Dentistry—Harris.
Pathology—Williams, Henley.
Practice—Wood, Watson, Stokes, Elliotson, Hempel.

1874

Anatomy—Gray, Wilson, Leidy.
Practice—Flint, Maxson, Scudder.
Surgery—Erichsen, Smith.
Obstetrics—Longshore, and West on Diseases of Women, West on Children.
Materia Medica—Stillé, U.S. Dispensatory, American Dispensatory
Physiology—Dalton, Kirkes and Paget, Todd and Bowman.
Microscopic Anatomy—Köllioker.
Chemistry—Youman's Class Book, Brande.
Pathology—Williams' Principles of Medicine.

The only change in 1875 was the substitution of Tanner for Maxson in "practice". In 1876 *Scudder's Specific Medication* was added in materia medica and Küss substituted for Kirkes and Paget.

1878

The following were recommended by the Faculty, the first named in each list as textbooks, and the others as works of reference.
Anatomy—Gray, Wilson, Leidy.
Practice—Roberts, Flint, Tanner, Scudder, Calkins, Bristow.
Surgery—Druitt, Packard's Minor Surgery, Clay's Obstetrical Surgery, Erichsen, Smith, Gross.
Obstetrics—Longshore's Philadelphia Prac-

tice of Obstetrics, West on Diseases of Women, and West on Children, Bennett on the Uterus.

Materia Medica—U. S. Dispensatory, American Dispensatory.

Scudder's Specific Medication, Thoroughgood, Riley.

Pharmacy—U. S Pharmacopoeia, Parrish.

Therapeutics—Bartholow, Waring, Stillé.

Physiology—Todd and Bowman, Küss, Marshall, Dalton, Carpenter.

Microscopic Anatomy—Kölliker.

Chemistry—Fownes, Brande, Attfield, Bowman's Practical.

Pathology—Williams' Principles of Medicine.

1879

The following were recommended by the Faculty. The first named in each list was preferred as the text book for the branch to which it belonged.

Anatomy—Gray, Wilson, Leidy, Allen's Dissector.

Practice—Bristow, Tanner, Roberts, Flint, Cormack's Clinical Medicine, Clapp on Auscultation and Percussion.

Surgery—Hamilton, Erichsen, Agnew, Holmes, Bryant, Sayre on Club Foot, Little on Deformities.

Obstetrics—Longshore's Philadelphia System of Obstetrics, Heywood, Smith and Thomas on the Diseases of Women, Churchill on the Diseases of Women, Atthill on Women, Bennett on Uterus, Ellis' Manual of Diseases of Children. Hillier's Clinical Treatise on the Diseases of Children.

Materia Medica—U. S. Dispensatory, U. S. Pharmacopoeia, Bartholow's Materia Medica and Therapeutics, H. C. Wood's Therapeutics, Headland's Action of Remedies, Sweringen's Dictionary of Pharmaceutical Science.

Physiology—Marshall, Carpenter, Dalton, Flint.

Chemistry—Fownes, Attfield, Bowman's Practical Chemistry, Youman's Class Book, Tanner on Poisons, Taylor's Medical Jurisprudence.

V. LIST OF MATRICULATES AND GRADUATES OF THE PENN MEDICAL UNIVERSITY

The letters M.D. indicate that the degree of Doctor of Medicine was conferred by the Penn Medical University in the year stated immediately following the degree. The absence of M.D. after a name means that available records show only that the person named was a matriculate in the year or years given. For graduates the available data is complete to the year 1879, but for matriculates the only lists which came to hand were for the years 1853, '55, '57, '58, '59 and '60. If the M.D. is enclosed in parentheses, i.e. (M.D.), neither the date nor the school which conferred the degree is evident from the university records alone. Any date following the "M.D." means that the holder of the degree spent that time, subsequent to receiving the degree, as a postgraduate. A parentheses around a letter or name indicates that existing records show variations, and the possibility that two different persons might be involved cannot be ruled out with certainty. Honorary and ad eundem degrees are so noted. An asterisk before a name means that the graduate served professionally in the army in the Civil War.

Most of the announcements from which the data for this list are drawn have been assembled by the Library of the College of Physicians of Philadelphia and the National Library of Medicine. The libraries of the Historical Society of Pennsylvania, the Library Company of Philadelphia, the State Library in Harrisburg, and the library of the New York Academy of Medicine also have holdings on this medical school.

	Residence	Thesis
Able, Lucy W., M.D., '60	Massachusetts	Dysentery
Abraham, Hannah, '55, '57, '58	Camden N.J.	
Andrews, Martin H., M.D., '57	New York (Pennsylvania)	Tuberculosis

	Residence	Thesis
Armstrong, Hannah, M.D., '59 (Birdsall)	Massachusetts (Indiana)	(see Birdsall)
Artand, Theodore, M.D., '60	France	Amaurosis
Atteridge, Annie, M.D., '62	Massachusetts	
Aubury, Imogene '55	Virginia	
Ayres, Henrietta E., M.D., '76	Philadelphia	
Bailey, Morris, M.D., '65	Ohio	
Bannister, Aurelia, M.D., '63 Ruggles	Pennsylvania	
*Barnes, Alonzo M., M.D., '58	Pennsylvania	The Qualifications of the Physician
Beach, Martin M., M.D., '54	New York	Respiratory Diseases
Bent, Hiram, M.D., '56	Maryland	Intermittent Fever
Berens, Dr. Bernard, M.D., '64, *Ad Eundem*	Pennsylvania	
Bermingham, Samuel P., M.D., '61	Massachusetts	Eclectic Medicine
Birdsall, Hannah, M.D., '59	Indiana (Massachusetts)	Anatomy and Functions of the Ear
*Blake, J. A. D., M.D., '61	Maine	The Physiology of Waste and Supply
Blake, Mary H., M.D., '63		
*Blake, M.D., Prof. William H., M.D., '77 (Honorary)	Philadelphia	
Blanche, Marie Antoinette '59	Philadelphia	
Blythe, John O., M.D., '58	New York (New Jersey)	The Original Development of the Teeth
Borland, J. R., M.D., '65	Pennsylvania	
Bowditch, Louisa M., M.D., '61	Massachusetts (New Jersey)	The Human Skeleton
Bradford, L. J., M.D., '65	Pennsylvania	
*Bradfield, J. Milton, M.D., '64	Pennsylvania	
Bradley, B. F. '55	Philadelphia	
Bridges, Joshua F., M.D., '64	New York (Pennsylvania)	True Progress in Medicine
*Bringhurst, M.D., William, M.D. '77 (Honorary)	Philadelphia	
Britton, Prof. Samuel, M.D., '63	New York	
Brock, James P., M.D., '54	Virginia	
Brooks, James B., M.D., '58	Virginia	Neuralgia
Brown, Amanda J., M.D., '74	Indiana	
Brown, Louisa, M.D., '78	New Jersey	
Brown, Margaret Boyd, M.D., '62	Massachusetts	The Uterus
Brown, Dr. Philip, *Ad Eundem*		
Brown, William S., M.D., '54	Boston, Mass.	Hydrocyanic Acid
Brown, (M.D.), William S., M.D., '62 *Ad Eundem*	Massachusetts (Scotland)	Hydrocyanic Acid
Bryan, J. E., M.D., '54	New York	Application of Electricity to the Treatment of Disease
Buckley, J. A. D., M.D., '62	Maryland	Disease and Its Cure
*Buckley, William C., M.D., '61	Pennsylvania	
Buckwalter, Sarah M., M.D., '77	Philadelphia	
*Burnham, Arthur H., M.D., '61	Massachusetts	Ligating the Carotid Artery
Bushnell, William, M.D., '55	Massachusetts	Lobelia Inflata
Busteed, Levinia, M.D., '61	Massachusetts	Mental Philosophy
Button, S., M.D., '75	New York	
Caldwell, Elizabeth, M.D., '62	Pennsylvania	Mind and Matter
Caldwell, Sarah, M.D., '59	Philadelphia	
Calkins, Marshall, M.D., '59 *Ad Eundem*	Pennsylvania (Massachusetts)	
Calvin, Elizabeth, M.D., '56	Pennsylvania	Woman as Physician

	Residence	Thesis
Chapman, Adalade V., '57, '58	Philadelphia	
Chappell, Miriam G. (C.), M.D., '58	New Jersey	Periodicity, a Law of Nature
Chisholm, Charles, M.D., '58	Delaware	Scarlatina
Clark, Betsy R., M.D., '61	Massachusetts	Pneumonia
Clover, M. M., M.D., '65	Pennsylvania	
Cohen, Elizabeth D. A., M.D., '57	Philadelphia	Prolapsis Uteri
Conroy, John W., M.D., '59	Rhode Island	Rubeola (Traumatic Tetanus)
Corl, Mrs. Ursala A., M.D., '64	Illinois	
Courtney, Abraham E., M.D., '58	Surg. R.N., London	The Diseases of the Man-of-War's Men
Cowden (1), Sarah, '55, '57, '58	Philadelphia	
Crowell, Charlotte, '55, '57, '58	Philadelphia	
Crozier, Annie Atteridge, M.D., '62	Massachusetts	Chronic
Cutter, Fred A., M.D., '58	Massachusetts	Vaccination
Daniels, L. A., M.D., '65	Massachusetts	
Darlington, Hannah, '55, '57, '58	Pennsylvania	
Davis, Frances V., '59	Pennsylvania	
Davis, John M., M.D., '64	New Jersey	
Davis, William B., M.D., '60	New Jersey	Puerperal Convulsions
Davis, William G., M.D., '64	Massachusetts	
DeAubury, Imogene, '55, '57, '58	Virginia	
Dennet, Maria J., M.D., '61	Vermont	The Brain
Dickinson, Alphonso C., M.D., '53	New Jersey (Pennsylvania)	The Imponderables
Dickson, (M.D.), Samuel, M.D., '58 *Ad Eundem*	London, England	
Donnelly, Blanche M., M.D., '78	Philadelphia	
Douglass, Sarah, '55, '57, '58	Philadelphia	
Dowling, Benjamin, M.D., '56	England	Gastritis
Dresser, Horace, M.D., '53 (Honorary)	New York	
Drury, Deborah, M.D., '57	Andover, Mass.	Symptomatology
Edgar, James T., M.D., '60 *Ad Eundem*	New York	
Edgerton, Cornelia M., M.D., '62	Vermont	Anatomy of the Nervous System
Ehrman, Francis H., M.D., '60		
Ellis, Emily, '57	Illinois	
Ellis, Hannah W. (M.D.), '53	Pennsylvania	
Elson, Mariana, M.D., '59	Germany	Animalcular Origin of Disease
Entrikin, Sarah A., M.D., '54	Pennsylvania	Digestion
*Esten, Elisha C., M.D., '61	Rhode Island	Mania a-Potu
Everett, Susan A., M.D., '60		
Everson, Hon. William K., M.D., '63 (Honorary)	Illinois	
Fagan, Josephine A., '55, '57, '58	New York	
Fairchild, Laura M., M.D., '60	New Hampshire	Scarlatina
Falken, M. D., Alexander, E. E., M.D., '79 (Honorary)	Pennsylvania	
Faloon, Matthew, M.D., '65	Illinois	
Fenno, Elizabeth M., M.D., '62	Massachusetts	Thought and Action
Ferguson, Willimanna, M.D., '61	Massachusetts	Music as a Therapeutic Agent
Firth, (M.D.), Horatio E., M.D., '57 *Ad Eundem*	New York	Disease, Its Nature and Cure
Fisher, Frederick, M.D., '56	New York	
Fis(c)her, Theophilus, M.D., '62	Pennsylvania	Uterus, Gestation and Forensic Medicine
Foot(e), Edw. Bliss, M.D., '60	Ohio	Electricity in Relation to the Human Organism
Fortiner, George R., M.D., '79	New Jersey	
Fortiner, Ida F., M.D., '79	New Jersey	

	Residence	Thesis
Frame, Christopher A., M.D., '76	Philadelphia	
French, Harriet, M.D., '64 (Schneider)	Pennsylvania	
Fuller, Adeline J., M.D., '66	Massachusetts	Ovarian Dropsy
Gall, Jacob Frederick, M.D., '53	Georgia (Louisiana)	Southern Climates
Gardner, (Dr.) Benoni E., M.D., '58 (Honorary)	Rhode Island	
Garvin, James A., M.D., '56	Philadelphia	Inflammation
Geissler, Maria, '55, '57, '58	Germany	
Gentol(t), Frederick, '57, '58, '59	Germany	
Gibbs, Godfrey, M.D., '71	Philadelphia	
Gilkerson, Agnes M., M.D., '61	Massachusetts	Chemistry
Gilliam, L. R., M.D., '63	Pennsylvania	
Goddard, Horatio W., M.D., '58	Connecticut	Death and Its Causes
Goulding, Anna, M.D., '60	Massachusetts	Medicine
G(r)all, Jacob Frederick, M.D., '53	Georgia	Southern Climates
Gregory, Samuel, M.D., '53 (Honorary)	Massachusetts	
Grennan, M. Adelaide, M.D., '61	Ohio (Indiana)	The Agency of Electricity in Reproduction
Grier, Maria J., M.D., '54	Pennsylvania	The Heart
Gross, Caroline L., M.D., '62	Pennsylvania	Woman as Physician
Haas, Henry, '57, '58, '59	Pennsylvania	
Hahneman, E. Francis, M.D., '60	Ohio	
Hall, William, M.D., '65	Ohio	
Hamilton, Dr. H. W., M.D., '61 *Ad Eundem*	Maine	
Hamilton, Robert, M.D., '58	New York	The Uterus and Its Disease
Hamlin, Susan A., M.D., '60	Maine	Supersensation
Hampton, John T., M.D., '64	South Carolina (North Carolina)	Puberty
Harris, A. Judson, M.D., '79	Pennsylvania	
Harrison, E. J., M.D., '64	England	
Hastings, Amelia, M.D., '57	Maine	The Structures and Functions of the Human Organism
Hatton, Louis, M.D., '64	New Jersey	
Haworth, Emily, '57	Indiana	
Hayland, Mary J., '55, '57, '58	Philadelphia	
Heller, John Florian, M.D., '56	Austria	
Henck, Mary H., '55, '57, '58	Philadelphia	
Hendrick, Edw. M. (William), M.D., '60	Missouri	Medical Science
Hester, Jacob, M.D., '60	Pennsylvania	Cornus Sericea
Hill, Mary H., M.D., '63	Pennsylvania	
Hitchcock, R., M.D., '60	Massachusetts	
Hohlfield, Frederick, '57, '58, '59	Bethlehem, Pa.	
Holler, John F., '57, '59	Austria	
Holloway, Mary M., M.D., '56	Indiana	Constituents of Organic Bodies
Hooper, William G., M.D., '64	North Carolina	Rubeola
Hoover, Mary, M.D., '64	Indiana	
Hopkins, George G., M.D., '58	Missouri	Intermittent Fever
Horn(e), William T., M.D., '64	Texas (Missouri)	The Periodism of Disease, Not Caused by Koino-Miasmata
Hough, Levantia J., M.D., '74	Indiana	
Howard, Mrs. Rebecca A., M.D., '64	Pennsylvania	
Huey, John, M.D., '53	Delaware	Stramonium
Hughes, Eliza C., M.D., '60	Virginia	The Blood
Humphreys, Mattie, '55, '57, '58	Philadelphia	

	Residence	Thesis
*Humphreys, Otis M., M.D., '61	New York	Specific Diseases
Hunter, Sarah A., M.D., '79	Illinois	
Huntoon, H. P., M.D., '61	Massachusetts	Rubeola
Huntoon, J. W., M.D., '61	Massachusetts	Malaria
Iverson, J. C., M.D., '61	Ohio	Small Pox
Jenkins, Anna J., '55, '57, '58	Philadelphia	
John, Clementine G., '59	Philadelphia	
Kelley, Mary Jane, '55, '57, '58	Philadelphia	
Kelling, C. L., M.D., '63	Pennsylvania	
Kelling, Mrs. Mary E., M.D., '64	Pennsylvania	
Kilgore, James L., M.D., '65	Pennsylvania	
*King, S. Chase, M.D., '58	Delaware (Pennsylvania)	Cholera Infantum
King, Dr. W. H., M.D., '58 *Ad Eundem*	Canada West	Aconite, Its Therapeutic Use
Kingsbury, Maria, '55, '57, '58	Ohio	
Kline, Robert H., M.D., '59	Ohio	Worms, Their History and Influence on the Human System
Knowles, I. H. D., M.D., '60		
Knowles, John F., M.D., '60	Delaware	Vital Atomic Movements
Koehler, Susannah C., M.D., '57	Philadelphia	Hernia
*Koerper, Egon, M.D., '56	New Jersey (Prussia)	Dropsy
Laurents, Alfred, M.D., '62	Massachusetts	
Leech, Charles A., M.D., '56	Philadelphia	Nervous Sympathy
Lessey, Justice, M.D., '61	Pennsylvania	Gun-Shot Wounds
Lewis, Mrs. Emma B., M.D., '74	Indiana	
*Linton, James D., M.D., '61	Pennsylvania	Vaccination
Litchfield, John, M.D., '56	Canada West	Chemistry
Livingston, William, M.D., '61	Pennsylvania	Cancer
Longshore, Rebecca H., M.D., '61 (Reynolds)	Pennsylvania	
Longstretch, Martha M., '53	Philadelphia	
Loomis, Mahlon, M.D., '57	District of Columbia (Massachusetts)	Diseases Arising from the Use of Metallic (Dental) Plates
Lukens, Susannah P., M.D., '64	Pennsylvania	
Lukins, Rachel '53	Pennsylvania	
*Lynch, N. R., M.D., '59	Delaware	On Medicine
Macomber, Charles, '57, '58, '59	Massachusetts	
Macomber, Sarah A., '55, '57, '58	Philadelphia	
Maddock, A. Beaumont, M.D., '58	England	Nervous Diseases
Maham, O. P., M.D., '65	Massachusetts	
Malone, D. R., M.D., '65	Indiana	
Manly, Dr. Bradford S., M.D., '60 *Ad Eundem*	Vermont	
Manly, Dr. Marcus Marcellus, M.D., '60 *Ad Eundem*	Vermont	
Mansfield, J. Leroy, M.D., '78	California	
Marcelini, D.D.S. Hon. Jules M.D., '60	Pennsylvania	
March, Augusta B., '57	Mississippi	
Markley, George B., M.D., '58	Pennsylvania	Prolapsis Uteri
Marsden, Hannah, M.D., '57	Philadelphia	Fevers
McBeth, J. W., M.D., '79	Ohio	
McBride, Anna, M.D., '62	Pennsylvania	Stimulants and Narcotics as Remedial Agents
McComas, J. M., M.D., *Ad Eundem* '76	Missouri	
McEwen, John R., M.D., '58	Pennsylvania	
McEwen, Matthew, M.D., '57	Pennsylvania	Phrenitis

	Residence	Thesis
Mellon, Ellen J., M.D., '56	Philadelphia	Alveolar Tissue
Mendall, Sarah, '53	New York	
Mercellini, D.D.S. Hon. Jules, '60	Pennsylvania	
Michener, Julia A., M.D., '62	Pennsylvania	Choice of a Nurse
Molle, John W., M.D., '60	Indiana	Capillary Blood-vessels of the Human Body
Moore, David F., M.D., '57	New Hampshire	Angina Pectoris
Moore, Rodney, M.D., '61	Rhode Island	Therapeutic Action of Electricity
Morgan, Edward A., M.D., '79	Pennsylvania	
Morris, Hon. Prof. William, M.D., '60	Pennsylvania	
Morse, Charles, M.D., '57	Massachusetts	Asthma, Its Nature, Causes and Treatment
Muncy, (M.D.), (Munsey) Barton, M.D., '57	Pennsylvania	Acute Rheumatism
Mundie, Prof. Charles, M.D., '63 (Honorary)	Massachusetts	
*Murphy, Prof. Charles, M.D., '63 (Honorary)	Pennsylvania	
Murray, Elizabeth '53	Massachusetts	
Myers, Jane V., M.D., '54	Ohio	Respiration
Needham, Nicanor, M.D., '53	Pennsylvania (New York)	Phrenology
Neff, Adaline, '55, '57, '58	Philadelphia	
Neilds (Nields), Henry, M.D., '57	Pennsylvania	Infectious Diseases
Neiss, F., '57, '58, '59	Prussia	
Newton, Charles, M.D., '59	New Jersey	Urticaria
Newton, J. R., M.D., '60	Ohio	
Newton, James R., M.D., '60	Ohio	Medical Fallacies
Nicholas, Achille, M.D., '59	Cuba (France)	Ancient and Modern Embalments
Norton, E. S. Stewart, M.D., '65	Maine	
Noyes, Luman (Suman), M.D., '62	Vermont	Diphtheria
O'Leary, Helen B., M.D., '61	Massachusetts	Influence of the Mind over Disease
Oren, (M.D.), Jesse, M.D., '58 *Ad Eundem*	Pennsylvania	Light, Essential to Life
Oren, M. A. P., '55, '57, '58	Philadelphia	
Painter, Hettie K., M.D., '60	New Jersey	Electricity as a Remedial Agent
Parsons, E., M.D., '75	Pennsylvania	
Parsons, Sarah E., M.D., '60	Pennsylvania	The Mental and Moral Position of Woman
Paul, Caroline, M.D., '64	New Jersey	
Peacault, Pierre E., M.D., '58	Canada West	Typhoid and Typhus Fevers
Pease, Giles, M.D., '58	Massachusetts (Rhode Island)	Observations on Phthisis
Pettingill, Eliza, M.D., '64	Pennsylvania	
Pettingill, Sarah B., M.D., '60	Maine (Philadelphia)	The Brain
Pfeifer, Fred B., M.D., '63	Pennsylvania	
Pfeifer, Nicholas, M.D., '63	Michigan	
Pieterre, Pierre, M.D., '64	France	
Plush, Samuel M., M.D., '76	Philadelphia	
Polis, Meline, 1857, '58	Philadelphia	
Pool(e), Annie M., M.D., '62	Massachusetts	Digestion
Porter, Ann N., M.D., '62	Illinois	Dysmenorrhea
Porter, Charles H., M.D., '79	Philadelphia	
*Powell, William C., M.D., '57	Philadelphia	Pneumonia
*Proctor, J. Columbus, M.D., '58	England	Dyspepsia
Randall, Marenda B., M.D., '54	Vermont	Man, His Origin, Life and Decay

	Residence	Thesis
*Rea, Thomas (James), M.D., '56	Philadelphia	Water and Diet as Therapeutic Agents
Reasch, William, M.D., '63	Pennsylvania	
Record, Henry A., M.D., '65	New Jersey	
Redmond, Cecelia A., M.D., '62	District of Columbia	Capillary Circulation
*Reed, Albert G., M.D., '62	New York	The Chemistry and Natural Philosophy of the Human Body
Reed, Anna M., M.D., '61 (Ruggles)	Pennsylvania	
Reese, Giles, M.D., '75	Rhode Island	
Rehn, Isaac, M.D., '74 (Honorary)	Pennsylvania	
Reichenbach, Count Frederick, M.D., '58 (Honorary)	Vienna	
Remick, Eliza J., M.D., '78	Philadelphia	
Reynolds, Rebecca A., M.D., '75	Pennsylvania	
Reynolds, Rebecca H., M.D., '61 (Longshore)	Pennsylvania	The Adaptation of Woman to the Medical Profession
Rice, Daniel E., M.D., '75	Philadelphia	
Rice, Julia, '57	Ohio	
Rice, Sarah A., M.D., '59	Massachusetts	The History of the Origin of Anatomy
Ridcout, Mary Melvina, M.D., '62	Massachusetts	Blood, Heart and Circulation
Ridgeway, Emily, M.D., '59	Pennsylvania	Secretion and Nutrition
Ridgeway, Mary F., '57, '58	Philadelphia	
Ridgeway, Philip R., M.D., '54	Boston, Mass.	Cholera Asphixia
Rob(b)ins, Charles W., M.D., '59	Pennsylvania	Scarlatina
Robi(n)son, (M.D.), Andrew H., M.D., '57	New York	Veratrum Viride
Robi(n)son, J. P., M.D., '59	Pennsylvania	Typhus Fever
Roney, W. C., M.D., '65	Pennsylvania	
Rose, Mary, M.D., '67	Virginia	Man
Ruggles, Anna M., M.D., '61 (Reed)	Pennsylvania	The Nervous System
Ruggles, Aurelia, M.D., '63 (Bannister)	Pennsylvania	
Rush, William, M.D., '75	Pennsylvania	
Rutton, William C., M.D., '58	Wisconsin (Ohio)	Monomania
Schmoele, Mary, '57, '58	Philadelphia	
Schneider, Harriet, M.D., '64 (French)	Pennsylvania	
Schulte, Henry B. (Frederick), '57, '58, '59	Prussia	
Schumacker, Henry, M.D., '62	Prussia	The Four Principal Symptoms of Inflammation
Seaman, C. D., '57	Ohio	
Shaffer, Anna, M.D., '62		
Sheppard, Prof. Furman, M.D., '53, (Honorary)	Pennsylvania	
Shermer, Henry B. '55	Rochester, N.Y.	
Shivers, Bowman H., M.D., '58	New Jersey	Diseases of the Uterus
Sickler, Jasper, M.D., '78	Pennsylvania	
Simmons, S. S., M.D., '77 *Ad Eundem*	Pennsylvania	
Slade, Alvinda, M.D., '64 (Wilhelm)	Pennsylvania	
Smith, (M.D.), Denis E., M.D., '57	New York (England)	The Pathology and Treatment of Convulsions
Smith, Myron N., M.D., '78	Pennsylvania	
Smith, Susan A., M.D., '54	Philadelphia (England)	The Mind and the Emotions

	Residence	Thesis
Soby, B. Franklin, M.D., '59	New Jersey	Diseases of the Mouth
Spears, Edmund D., M.D., '59	Massachusetts (New Jersey)	The Spleen
Stambach, Annie M., M.D., '57	Philadelphia	Medical Professions
Stanton, Edna, '57	Indiana	
Stearne(s), Rev. George W., M.D., '64 (Honorary)	New York (Pennsylvania)	The Mesentery
Steck, (M.D.), John H., M.D., '57 (Honorary)	Pennsylvania	Angina Membrania
Stiles, O. D., M.D., '65	Pennsylvania	
Stolz, J., M.D., '65	Pennsylvania	
Stratford, H. K., M.D., '65	Pennsylvania	
Stuart (Stewart), Hiram A., M.D., '63	Ohio	
Stuart, H. H., M.D., '64	Pennsylvania	
Sturdivant, Thomas, M.D., '63	Pennsylvania	
Summers, Henry A., M.D., '65	Pennsylvania	
Swift, Mary, '57	Philadelphia	
Swoop, William L., M.D., '60	Tennessee	Pneumonia
Swope, M., M.D., '60		
Tarr, August DeKalb, M.D., '60	Pennsylvania	The Human Organism
Taylor, Alonzo C., M.D., '65	Pennsylvania	
Taylor, J., M.D., '65	Pennsylvania	
Taylor, Mary Ann., M.D., '58	Tennessee	Conception
Taylor, Sarah, '57	Ohio	
Thayre, Ellen, '57	Vermont	
Thomas, Prof. A.R., M.D., '54 (Honorary)	New York	
Thomas, E. B., '55, '57, '58	Philadelphia	
Thomas, Lavinia D., M.D., '57	Watertown, N.Y.	Scarlatina
Thomas, Mary F., M.D., '56	Fort Wayne, Ind.	Ovarian Dropsy
Thomas, Rebecca B., '55, '57, '58	Philadelphia	
Thompson, John, M.D., '58 (Honorary)	New York	
Thompson, Joseph P., M.D., '58	New York (New Jersey)	Typhus Fever
Thurber, Edward R., M.D., '60	Louisiana	Debility
Thurber, John A., M.D., '60	Louisiana	Pneumonia
Tobias, Susan, M.D., '78	Philadelphia	
Townsend, Clara, '55, '57, '58	Philadelphia	
Tribber (Trieber), Jacob B., M.D., '64	New York	Stillingia
Tucker, C. A., M.D., '65	New York	
Tucker, H. A., M.D., '65	New York	
*Vickers, Joseph P., M.D., '61	Pennsylvania	The Teeth
Virgil, Clinton D., M.D., '58	Pennsylvania	
Wagner, (M.D.), Magdalena, M.D., '79 (Honorary)	Philadelphia	
Waldie, Walter S., '57, '58, '59	Pittsburgh, Pa.	
Waters, T. P., M.D., '65	Pennsylvania	
Watson, Rachel, '57	Ohio	
Weaver, Rufus B., M.D., '65	Pennsylvania	
Webster, (LL.D.), Horace A., M.D., '59 (Honorary)	New York	
Weikel, Adelaide, M.D., '63	Pennsylvania	
Weldon, William H., M.D., '78	Philadelphia	
Wheeler, John D., M.D., '65	Pennsylvania	
Whitney, A. B., M.D., '64	New York	
Whitney, (M.D.), E., M.D., '64	New York	Yellow Fever
Whitney, Rebecca S., M.D., '60	Massachusetts	The Functions of the Liver
Wileman, Esther C., M.D., '56	Ohio	A Thesis: What Is It?

	Residence	Thesis
Wilhelm, Mrs Alvinda, M.D., '64 (Slade)	Pennsylvania	
Wilhert, Mary M., M.D., '56		
Willard, Andrew F., M.D., '62	New York	Study of Medicine
Willard, Franklin B., M.D., '59	Massachusetts	Syphilis, an Examination of its Mercurial Treatment
Wilson, Angeline L., M.D., '59	Indiana	Leukorrhea
Wilson, Walter M., M.D., '61	Massachusetts	Water, as a Remedy
Wolfe, Charles De, M.D., '64	Vancouver Island	
Wolfe, Mary Ellen, M.D., '56	Pennsylvania	The Eye
Wolseiffer, Phillip R., '57, '58, '59	Philadelphia	
Wood, Zelinda, M.D., '60	Pennsylvania	The Pathological Phenomena Incident to Parturition
Woods, Virginia A., M.D., '61	Louisiana	Necrosis
Worrel, Susannah C., M.D., '57		
Young, John D., M.D., '65	Vermont	
Young, Margaret G., M.D., '58	Glasgow, Scotland	Pathology
Young, Sarah H., M.D., '56	Lowell, Mass.	The Essential Conditions of Life
Zeiber, B. H. (Jacob), M.D., '59	Pennsylvania	Stillingia Sylvatica
Zender, Rev. J. D. L., M.D., '56	France	The Solar Microscope

ACKNOWLEDGMENTS

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Memoir of Margaret Castex Sturgis (1885–1962)*

By MARION S. FAY, PH.D.

BORN in Goldsboro, North Carolina, Margaret Castex Sturgis was descended from Dr. Germaine Castex, a political refugee from France who came to the new country in the latter part of the 18th century. The Honorable John Jenkins, Colonial Governor of North Carolina in 1673, was an ancestor on her maternal side. Her preprofessional education was received at the Goldsboro High School and at the Woman's College of the University of North Carolina.

Dr. Sturgis and her first husband, Henry S. Jones, began the study of medicine under the inspiration of his mother, Dr. Clara E. Jones, a graduate of The Woman's Medical College, 1894. After receiving the M.D. in 1915, Dr. Sturgis interned at the New York Infirmary for Women and Children.

In 1916, her second marriage, to Dr. Samuel B. Sturgis of Philadelphia, took place. When he entered the army in the First World War she applied for a surgical residency at New York Hospital and became the first woman to serve in this capacity. Returning to Philadelphia, she was appointed to the Faculty of the Woman's Medical College of Pennsylvania as Assistant Clinical Professor of Gynecology. Post-graduate study in Paris and Vienna and constant study and practice in her specialty brought her faculty advancement and wide recognition among her medical colleagues. She became a Diplomate of the American Board of Obstetrics and Gynecology, Fellow of the American College of Surgeons and of the College of Physicians of Philadelphia.

Her hospital appointments included chiefship in gynecology at the Woman's Hospital of Philadelphia, the Hospital of the Woman's Medical College and the Philadelphia General Hospital. When the program for cancer control was begun at the Woman's Medical College in 1938, she collaborated with Dr. Catharine Macfarlane and Dr. Faith Fetterman in the periodic examinations and published a number of papers on their findings. In 1942, Dr. Sturgis was appointed Professor and Chairman in the Department of Gynecology. Her skillful and sympathetic teaching won the admiration and affection of her students. It was with a very special regret that her resignation was accepted in 1946, a step necessitated by her serious illness.

Dr. Sturgis served her *Alma Mater* in many capacities. An active alumna, she was elected President of the Alumnae Association for the two years 1926–28, and received the Achievement Award of that association in 1955. From 1949 to 1956 she was a member of the Board of Corporators of the College and upon her resignation was named the first Honorary Corporator.

Many honors came to her—membership in Alpha Omega Alpha, honorary membership in Phi Beta Kappa in the Chapter at the Woman's College of the University of North Carolina; Doctor of Humane Letters (honorary) from this same College and Doctor of Medical Sciences (honorary) from The Woman's Medical College of Pennsylvania. She was too ill to receive this latter award and her husband received it in her name.

Her professional achievements and their recognition were only a part of this very useful life. Her personal life as devoted wife, gracious hostess and charming woman enhanced her understanding as a physician. Her wide interests outside of medicine included memberships in the Alpha Epsilon Iota fraternity, Daughters of the American Revolution, the Colonial Dames of America, the United Daugh-

* Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

ters of the Confederacy, the Swedish Colonial Society, The American Swedish Historical Foundation, and the National League of American Pen Women. An award from the Philadelphia Branch of the League was made to her in 1955.

The deep personal satisfaction, which a doctor gains from the affection and confidence of his patients, was hers in great measure. This together with a very happy marriage brought her contentment. The unselfish and affectionate care of her husband and the admiration of her friends, students and patients remained with her until her death on July 13, 1962. That admiration lives on as a tribute and memorial to a beloved physician and a great lady.

Memoir of Joseph Victor Klauder (1888–1962)*

By HERMAN BEERMAN, M.D.

DR. JOSEPH VICTOR KLAUDER ('Joe' to his friends), Emeritus Professor of Clinical Dermatology in the Graduate School of Medicine of the University of Pennsylvania, died suddenly on April 2, 1962. The College of Physicians of Philadelphia has lost a staunch friend and a Fellow of forty-two years' standing.

Dr. Klauder, a lifelong resident of Philadelphia, was born on October 12, 1888. In 1919 he married Eleanor Stalder, who survives him. There were no children from this long union. He received his B.A. from LaSalle College in 1908, his M.D. from the University of Pennsylvania in 1912, and on April 6, 1962, was to have participated actively in the Medical Alumni Day to receive an award for fifty years as an alumnus of the School of Medicine of the University of Pennsylvania. He interned in the Episcopal Hospital of Philadelphia from 1912 to 1914. His graduate training in dermatology began with visits to the London, Liverpool and Paris dermatologic clinics in 1915. In 1920, after two years of War Service, he became a preceptee of Dr. J. Frank Schamberg, the first Chairman of the Department of Dermatology and Syphilology of the Graduate School of Medicine, University of Pennsylvania. Dr. Klauder's career in dermatology has encompassed the entire history of this school. In addition, Dr. Klauder's connections with Philadelphia area medical institutions included: Professor of Dermatology at Woman's Medical College of Pennsylvania from 1923 to 1938; Dermatologist to Wills Eye Hospital, Philadelphia, and to Our Lady of Lourdes Hospital, Camden. He was a long-time Chief at the Philadelphia General Hospital, the Fitzgerald Mercy Hospital, Darby; the Misericordia Hospital, Philadelphia; the Chester County Hospital, West Chester; and the Presbyterian Hospital, Philadelphia. He was made Consulting Dermatologist to all these hospitals on his retirement.

Dr. Klauder was certified by the American Board of Dermatology and Syphilology in 1935 and was a member of many professional organizations, including: The American Dermatological Association, of which he was Past President; The American Academy of Dermatology and Syphilology; a Founder and Past President of The Society for Investigative Dermatology; and Past Chairman of the Section of Dermatology and Syphilology of the American Medical Association. He was Past President of the Philadelphia Dermatological Society at the time I was Secretary.

Dr. Klauder was a member of numerous organizations dealing with industrial hygiene and medicine. A number of foreign dermatological associations also honored him by membership. Before the Dermatologic Research Laboratories were turned over to Temple University, Dr. Klauder was a member of the Board of Trustees of that organization. It was then called, "Dermatologic Research Institute and Research Institute of Cutaneous Medicine."

Among the many honors which Dr. Klauder received was an Honorary Degree of Doctor of Science from the University of Pennsylvania in 1959, for his contributions to the understanding of the interrelationship of cutaneous diseases in human and veterinary medicine.

Dr. Klauder was the author of numerous publications dealing with his special fields of interest and hobbies. He was a renowned expert on oculocutaneous diseases, largely because of his connection with the Wills Eye Hospital of Philadelphia. He was an early active student of experimental syphilis. He

* Read before the College of Physicians of Philadelphia, 3 April 1963. Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

was one of the first, if not the first, American dermatologist to advocate the importance of the psyche in dermatoses. The characteristics of sarcoidosis in the American Negro were described for the first time by Dr. Klauder and the late Dr. Frederick D. Weidman, and their publications on this subject stimulated a large field of interest in sarcoidosis in this country. There was no phase of dermatology with which Dr. Klauder was not conversant.

Dr. Klauder was an avid reader of Joseph Conrad and A. Conan Doyle was one of his special interests; in fact, he was a Master Beechsmith, the highest rank of the Sons of Copper Beeches, a Scion Society of the Baker Street Irregulars, devoted to the writings of A. Conan Doyle on Sherlock Holmes.

Dr. Klauder visited many clinics in different parts of the world. His last trip, which included a visit to India and other countries, was a great pleasure to him and Mrs. Klauder, and his impressions of Indian medicine were published in "Philadelphia Medicine" in 1960.

In addition to his training of graduate students, Dr. Klauder had a number of preceptees in his office, some of whom had been associated with the University of Pennsylvania as graduate students in the Graduate School of Medicine as well. His preceptees found Dr. Klauder to be quite reserved, on occasions relatively uncommunicative, but on the whole, always a brilliant morphologic diagnostician in dermatology. He kept extraordinarily good records and his office preceptees learned much by studying his patient-records and observing his treatment schedules. He was an outstanding therapeutist and well known for his work in syphilis and in industrial dermatology, in which field he had an international reputation. One associate of seventeen years' standing rated Dr. Klauder as an outstanding teacher with a remarkable memory of earlier cases which presented particular points of interest. He was always aware of the changing clinical picture based on his memory of these older cases and was able to apply this experience to newer concepts. He had an aversion to treatment with proprietary preparations. He had a way of handling elderly patients which was always the admiration of his associates. I knew Dr. Klauder for more than thirty years and never heard him raise his voice in anger or in irritation. One of his former preceptees stated, "He was the epitome of the careful, exacting, scientific student. It was said of him that he could have worked on a desert island and found the same intense, scientific interest even in a grain of sand upon the beach. He played very little but was always the intense student. Every problem new or old required careful initial investigation, regardless of how much work had been previously spent on it."

In all my experience with Dr. Klauder I never ceased to marvel at his intense interest in his work, even to the last evening of his life, on which I was privileged to be with him. During this visit many subjects were discussed: Sherlock Holmes; his ambitions to pursue certain lines of investigation; his eagerness to be host to foreign visitors during the Twelfth International Congress of Dermatology, and many other subjects which had been engaging his attention. The medical world has lost a great teacher, physician, student and friend.

Transactions of the Section on General Medicine

25 February 1963

Multiple Myeloma and the Myeloproliferative Disorders. Jerome I. Brody, M.D.,* Lawrence H. Beizer, M.D., and Stanley Schwartz, M.D.* (Discusser: John W. Frost, M.D.) (*Abstract 1*, below)

The Epidemiology of Embolism. George R. Fisher, M.D., and Harold L. Israel, M.D. (Discusser: Joseph B. Vander Veer, M.D.) (*Abstract 2*, below)

Urinary Excretion of Lysozyme by Patients with Renal Disease. Warren D. Davidson, M.D.,* and Darwin J. Prockop, M.D., PH.D.* (Discusser: Laurence G. Wesson, Jr., M.D.*) (*Abstract 3*, below)

Crohn's Disease of the Colon. Edward C. Raffensperger, M.D. (Discusser: Frank P. Brooks, M.D.) (*Abstract 4*, below)

25 March 1963

Retroperitoneal Hemorrhage During Heparin Therapy. Francis S. Morrison, M.D.,* and Harold A. Wurzel, M.D. (Discusser: Bernard Pastor, M.D.) (*Abstract 5*, below)

Hypokalemia, Sentinel of Renal Hypertension. Harold D. Itskovitz, M.D.,* Alfred M. Sellers, M.D., and Eugene A. Hildreth, M.D. (Discusser: Albert N. Brest, M.D.) (*Abstract 6*, below)

"Cold" Inflammation in Ischemic Extremities. Meyer Naide, M.D., Jacob S. Wiener, M.D.,* and Charles Schnall, M.D.* (Discusser: Brooke Roberts, M.D.) (*Abstract 7*, below)

The Reversibility of Protein - Losing Gastroenteropathy. John R. Senior, M.D.,* and Benjamin Pinto, M.D.* (Discusser: Frank P. Brooks, M.D.) (*Abstract 8*, below)

22 April 1963

(Joint Meeting, Section on General Medicine, The College of Physicians of Philadelphia, and the Greater Philadelphia Chapter of the American Federation for Clinical Research.)

Selection of Biopsy Procedures for Diagnosis of Sarcoidosis. Harold L. Israel, M.D., and Maurice Sones, M.D. (Discusser: Thomas F. Nealon, M.D.) (*Abstract 9*, below)

Renal Functional Recovery Following Anuria Secondary to Renal Artery Embolism. Albert N. Brest, M.D., Robert Bower, M.D.,* and Charles Heider, M.D.* (Discusser: George D. Webster, Jr., M.D.*) (*Abstract 10*, below)

A Simple Bedside Ventilatory Test for Bronchial Asthma. Leonard S. Girsh, M.D., and Louis Tuft, M.D. (Discusser: George Pogar, M.D.*) (*Abstract 11*, below)

Preoperative Localization of Pheochromocytoma. Daniel S. Fleisher, M.D.,* Gerardo Voci, M.D.,* Samuel L. Cresson, M.D.,*, and Lester Karafin, M.D.* (Discusser: F. William Sunderman, Jr., M.D.) (*Abstract 12*, below)

ABSTRACTS

Abstract 1

Multiple Myeloma and the Myeloproliferative Disorders. Jerome T. Brody, M.D., Lawrence H. Beizer, M.D., and Stanley Schwartz, M.D., Department of Medicine, Graduate Hospital of the University of Pennsylvania.

The purpose of this report is to describe two female patients with multiple myeloma, one of whom had concurrent polycythemia vera and the other concomitant myelofibrosis with myeloid metaplasia. The clinical and laboratory features of both patients help to support the concept of a dynamic interrelationship between diseases of the blood-forming organs.

The first patient, a 66-year old retired nurse, was admitted to the hospital in 1956, for

* By invitation.

* By invitation.

procidentia, at which time splenomegaly, leukocytosis, elevated hematocrit and increased red cell mass were detected. A diagnosis of polycythemia vera was established and appropriate therapy instituted. Some time later hypergammaglobulinemia, Bence-Jones proteinuria and bone marrow plasmacytosis were discovered, with maintenance of the high hematocrit. The next several years demonstrated circuitous laboratory transitions indicating the simultaneous presence of both multiple myeloma and polycythemia vera.

The second patient, a 49-year old housewife, entered the hospital because of symptoms secondary to anemia. In addition to marked skin and mucosal pallor, splenomegaly of moderate degree was noted. There were immature erythroid and granulocytic precursors in the peripheral blood with rouleaux formation of the red cells in addition to giant platelet forms. Hypercalcemia, homogeneous hyperbetaglobulinemia and Bence-Jones proteinuria all were present. Initial bone marrow aspiration resulted in a "dry tap", but bone marrow biopsy and splenic puncture revealed myelofibrosis, focal plasmacytosis and myeloid metaplasia. The observations of multiple myeloma occurring together with polycythemia vera and myeloid metaplasia suggest that the postnatal functional separation of fetal stem cells may, under appropriate stimuli, revert to the mixed hematopoiesis of the embryo.

Abstract 2

THE EPIDEMIOLOGY OF EMBOLISM. George R. Fisher, M.D., and Harold L. Israel, M.D., Philadelphia General Hospital.

In reviewing recent cases of pulmonary embolism on the Medical Service of Philadelphia General Hospital, we have been struck by how infrequently the diagnosis was suspected. In a group of 3350 consecutive admissions of more than 48 hours duration, it was found that 31 died with a pulmonary embolism large enough to contribute to death in spite of anticoagulant therapy. There were another 41 cases proven at autopsy in which the diagnosis was not considered likely enough to warrant therapy, and 14 more untreated cases who died and were considered by us probably to have died of embolism but did not have autopsy examination. There were still another 27 cases in whom emboli were found at autopsy but were probably only incidental findings. It seems logical to us that phlebitis, incidental emboli, and fatal emboli are merely phases of the same condition, venous thromboembolic disease. The overall incidence of this condition would appear to be a minimum of eight per cent of Medical Service admissions.

With the aid of retrospect, there often seemed to be evidence of embolism in the admission chest x-ray or admission electrocardiogram.

We therefore feel that most of these patients either had their embolism prior to admission or had previous episodes of multiple emboli; we found very few cases who developed embolism as a late complication of prolonged bed rest. Very few of these cases had hemoptysis, Homan's sign or pleuritic pain; expectation of these findings by the physicians probably considerably increased the diagnostic inaccuracy.

The correlations which appeared to give most clues were with congestive heart failure. We were unable to state with certainty whether or how often the condition congestive failure predisposes to venous thromboembolic disease, whether it increases the mortality rate from emboli, whether it alters the clinical state to mask the usual clues of emboli, or whether the edema of phlebitis and the dyspnea of embolism merely dissemble congestive heart failure. There was also high correlation with atrial fibrillation, pleural effusion and shock. A large number of other factors were found to demonstrate no correlation, among them smoking, alcohol, home situation, age, sex, race, serology, malignancy, serum cholesterol, or history of previous heart disease.

Abstract 3

URINARY EXCRETION OF LYSOZYME BY PATIENTS WITH RENAL DISEASE. Warren D. Davidson, M.D., and Darwin J. Prockop,

M.D., PH.D. University of Pennsylvania School of Medicine and the Philadelphia General Hospital.

Although the presence of lysozyme in some human urines has been reported previously (Wilson and Hadley, Journal of Pediatrics *36:* 199, 1950), the enzyme in urine has not been well characterized and its significance has not been established.

No lysozyme activity was found in the urine of 50 normal adults or of 25 patients without renal disease, but urine from 19 of 23 patients with azotemia contained from 5 to 120 μgm. equivalents of lysozyme per ml. Assay of serum from 9 patients whose urine contained lysozyme indicated that all had increased serum levels of lysozyme, but the serum elevations were not proportional to the amount excreted. Also, no direct correlation was observed between lysozyme excretion rates and the degree of proteinuria, pyuria, or azotemia. Lysozyme isolated from urine was comparable to egg white lysozyme in its substrate specificity, response to inhibitors, pH optimum and heat stability.

Administration of egg white lysozyme to normal dogs indicated that after infusion of 10 mg., less than 0.3 mg. was recovered in urine, but after infusion of 1.3 gm., the enzyme was recovered almost quantitatively and the plasma clearance rate approached the rate of glomerular filtration.

These observations suggest that the excretion of lysozyme seen in some patients with kidney disease is the result of increased rates of synthesis or release of the enzyme by tissues. Since the kidney is normally rich in lysozyme, it is possible that the excretion of lysozyme is directly related to the destruction of renal tissue.

Abstract 4

CROHN'S DISEASE OF THE COLON. Edward C. Raffensperger, M.D., Hospital of the University of Pennsylvania.

The pathological findings characteristic of nonspecific regional enteritis, first described by Crohn, Ginsberg, and Oppenheimer, were reported to be present in the colon in 25 cases by Lockhart-Mummery and Marson in 1960. These authors termed the condition, Crohn's Disease of the Colon. Two cases of this disease are reported.

The first was that of a 25-year old man whose chief complaints were diarrhea, weight loss, and weakness. His course was complicated by multiple perirectal abscesses and by an attack of acute schizophrenia. Uncontrollable diarrhea and perianal abscesses necessitated a total colectomy in 1957, two years after the onset of his disease. Two years thereafter, he developed symptoms of chills, fever, malaise, weakness, and diarrhea. Upper gastrointestinal x-rays showed mucosal disease in the duodenum. The mucosal disease progressed to stenosis and partial obstruction. Surgery was performed in February, 1962, and a biopsy was taken of the constricted area which showed pathological findings commensurate with the diagnosis of Crohn's Disease.

The second case was that of a man, aged 62, whose chief complaints were fever, weakness, and the passage of several soft bowel movements per day. Physical examination and studies revealed only a questionable area of mucosal involvement in the proximal transverse colon. The patient continued to do poorly, with increase in symptoms requiring an exploratory laparotomy. The total involvement of the colon was found with microscopic pathological findings of perivascular granulomatous infiltration. This pathological finding has been described in Crohn's Disease affecting the ileum.

Abstract 5

RETROPERITONEAL HEMORRHAGE DURING HEPARIN THERAPY. Francis S. Morrison, M.D., and Harold A. Wurzel, M.D. Department of Medicine and the William Pepper Laboratory of Clinical Medicine, School of Medicine and Hospital of the University of Pennsylvania.

Heparin is a most valuable drug with which to prevent clotting of blood in certain patients when this is necessary (phlebitis, coronary

artery occlusion). There are occasions when it might be harmful. In a review of our patients with retroperitoneal hemorrhage we found that 12 of 37 were receiving heparin to prevent clotting in phlebitis or coronary artery disease. Moreover, we found that they were receiving the drug by injection into the muscles of the thigh or buttock.

We present the hypotheses that heparin when injected into the thigh or buttock might be carried up along the muscle bundles into the retroperitoneal space, in a fairly high concentration, and help to cause bleeding in this area.

We suggest that heparin should be given intravenously, or into the abdominal fat pad which is isolated by connective tissue sheets from the retroperitoneal space.

Abstract 6

HYPOKALEMIA, SENTINEL OF RENAL HYPERTENSION. Harold D. Itskovitz, M.D., Alfred M. Sellers, M.D., and Eugene A. Hildreth, M.D. Hospital of the University of Pennsylvania.

A high incidence of hypokalemia (serum potassium less than 3.5 mEq/L) among patients with severe hypertension has previously been reported. The hypokalemia was not a result of thiazide diuretic therapy, abnormal gastrointestinal intake or loss of potassium, or the presence of an adrenal aldosterone producing adenoma. Since renin and angiotensin have been shown to stimulate the production of aldosterone, the present study was undertaken to reinvestigate the mechanism and significance of hypokalemia among hypertensive patients in terms of this physiologic relationship. Patients receiving thiazide diuretic therapy were excluded from this study.

The reported incidence of hypokalemia in the general population is less than 2%. Among patients with hypertension studied by us and those reported in the literature, hypokalemia has been measured in 5 to 52% of patients, the incidence appearing to increase directly with the severity of the hypertensive cardiovascular disease.

A retrospective review of 82 hypertensive patients who underwent renal arteriography at the Hospital of the University of Pennsylvania during the past two years revealed significant renal arterial lesions in 21 of this number. Eleven of these 21 patients had a low serum potassium concentration. Hypokalemia was present in a total of 22 patients in our series, eleven of whom were found to have renal arterial lesions, whereas a significantly lower incidence of such lesions was observed among patients with a normal serum potassium level. Most hypertensive patients with hypokalemia who had negative renal arteriograms were found by renal biopsy to have a severe degree of nephrosclerosis. Eleven patients with renal artery lesions underwent surgery in an effort to cure their hypertension. A good hypotensive response was obtained in six patients following surgery, four of whom were hypokalemic. The blood pressure remained elevated in the remaining 5 patients, all but one of whom had a normal serum potassium.

Renal biopsies obtained in 27 patients revealed hypergranular juxtaglomerular cells in 6 of 9 patients with hypokalemia, compared to only 2 of 18 with a normal serum potassium. An increase in juxtaglomerular granularity has previously been correlated with increased renin secretion by the kidney. In one patient with hypokalemia and hypergranularity the urinary excretion of aldosterone was measured and found to be three times normal.

The present findings are consistent with previous studies in which a high incidence of hypokalemia has been found among patients with severe hypertension. In addition, hypokalemia was also frequent among hypertensive patients with renal artery lesions. Our studies of juxtaglomerular granularity suggest an increase in renin and angiotensin secretion with resultant secondary aldosteronism as the mechanism for this hypokalemia.

Thus hypokalemia, by reflecting increased renin secretion, may often be an important sign of a functionally significant renal arterial

lesion and a potentially curable form of hypertension.

Abstract 7

"Cold" Inflammation in Ischemic Extremities. Meyer Naide, M.D., Jacob S. Weiner, M.D., and Charles Schnall, M.D.

Despite the dramatic advances in the treatment of ischemic extremities with arterial surgery, amputations are still frequently necessary. It is important to be able to recognize when further treatment to save the extremity is useless and simply prolongs the agony and saps the strength of the patient. An observation that has proved useful for this purpose is the failure of inflammation to cause a rise in temperature or "cold" inflammation in very ischemic legs. When an extremity is so ischemic that inflammation fails to result in a rise in local skin temperature, amputation is inevitable unless the blood flow can be increased. In fifteen patients observed by us in whom lymphagitis or acute infection did not result in a rise in local skin temperature, amputation was required in fourteen. In only one of the fifteen patients did arteriography reveal a patent artery with adequate run off to permit direct arterial surgery. In this patient, a vein graft into a very sclerotic popliteal artery preserved the extremity for eight months, at which time gangrene extended and amputation became necessary. It was learned by experience that when this sign was present, sympathectomy was useless. Two illustrative cases were discussed. This sign is of particular value in hospitals which do not have facilities for doing vasodilatation tests. This facility is not available in the great majority of hospitals. The presence of "cold" inflammation should enable one to avoid procedures which offer little or no hope for saving an extremity.

Abstract 8

The Reversibility of Protein-Losing Gastroenteropathy. John R. Senior, M.D., and Benjamin Pinto, M.D., Medical Services, Philadelphia General Hospital.

Protein-losing gastroenteropathy is a disorder characterized by edema, hypoproteinemia especially affecting the albumin fraction, and excessive loss of protein through the gastrointestinal tract. This has been described in association with various diseases, such as giant hypertrophic gastritis, gastric malignancy, tropical and non-tropical sprue, intestinal inflammatory states with hypogammaglobulinemia, regional enteritis and ulcerative colitis, Whipple's disease, and congestive heart failure. In addition there have been reports of patients with hypoalbuminemia due to accelerated loss of protein via the gastrointestinal tract who showed no grossly obvious disease, although in some of these dilatation of the lymphatic channels of the intestinal villi has been noted. It has become apparent that excessive alimentary tract protein loss is a manifestation common to many and diverse diseases, and does not in itself constitute a disease entity but rather a clinical syndrome. It may be inferred, therefore, that the characteristic disturbances of protein-losing gastroenteropathy potentially may be minimized or reversed in those situations in which the underlying disease can be corrected.

To illustrate such a potentially-reversible situation, it may be instructive to consider briefly the case of a dyspneic and edematous negro male, aged 57, who was admitted to the Medical Service* of the Philadelphia General Hospital in May, 1960. His symptoms of ankle edema, orthopnea and exertional dyspnea had dated back to 1952, and he had since been more or less under continuous treatment in and out of hospitals in New York City. He was found to have cardiomegaly and pleural effusions, atrial flutter, low voltage QRS complexes, and a serum protein of 4.5 gm. per ml. of which 2.4 was albumin. He improved and was discharged, but readmission in April, 1962, was necessitated by recurrent edema of the legs, ascites, pleural effusions despite digitalis and diuretics. He had a large

* Service A1, of Dr. Harold L. Israel, through whose kindness we were privileged to study this patient.

liver, venous pressure was elevated to 265 mm. of saline and circulation time from arm to tongue was 28 seconds. Protein-bound iodine values of 2.9 and 2.3 μgm. per 100 ml. of serum were obtained, but he had a normal I^{131} uptake of 37% and a serum cholesterol of 165 mg per 100 ml. Although he again responded to therapy, readmission in October, 1962 was forced by massive edema and congestive failure. Findings included an apical diastolic gallop, distant heart sounds, absence of any point of maximal impulse over the precordium, a wandering atrial pacemaker and low amplitude QRS complexes. Venous pressure was 330 mm. of saline, and his circulation time was 37 seconds. The urine at no time showed any protein. Electrophoretic values of serum albumin of 1.94, 2.24, and 1.91 were obtained; his serum iron was 40 μgm. per 100 ml. and the iron binding capacity 380 μgm. per 100 ml. After improvement, liver biopsy showed chronic passive congestion, but no cirrhosis.

The lack of evidence for decreased hepatic albumin synthesis or urinary loss of protein led to biopsy of his jejunal mucosa by Crosby-Kugler capsule, which revealed dilatation of lacteals of a number of the intestinal villi. Metabolic studies using I^{131}-albumin showed his total body albumin pool to be reduced to 1.83 gm. per kg body weight (normal 4.1 gm. per kg), and the albumin half-life to be only 4.2 days (normal 13 to 20 days, mean 17 days). The daily fractional albumin degradation was increased to 15.3% (normal 4 to 5%). The computed synthetic rate of albumin was increased, however, to 70% greater than the rate expected even if he had a normal total body albumin. After intravenous Cr^{51}-albumin, a four-day fecal collection showed 21.4% of the administered radioactivity (normal 0.23%, range 0.06 to 0.63%), thus confirming markedly increased gastrointestinal albumin loss. The unexplained cardiomegaly, persistent high venous pressure, low QRS waves and the finding of 10 to 15 mm. of Hg paradoxical pulse led to cardiac catheterization.† Thickening of the right atrial wall to about 11 or 1 mm. was estimated from the positions of th catheter tip and the atrial outline by fluoros copy, decreased movements of the heart and elevated pressures of 28 mm. Hg in th right atrium, 45/25–28 in the right ventricle 40/28 in the left pulmonary artery, and 29/2 in the left atrium. His oxygen saturation wa 90% in the brachial artery, cardiac output 3.6 liters per minute, and his vital capacity an maximal breathing capacity reduced to abou 30% of normal. Angiocardiography showe the chambers of the heart to be of essentiall normal size. The findings suggested impedanc to ventricular filling in diastole, pericardia thickening, probably due to constrictiv pericarditis. Thoracotomy was advised, witl pericardectomy if direct observation confirme constrictive pericarditis. The patient wa transferred to the surgical service and i awaiting thoracotomy.

† Carried out through the kind cooperation of Dr. David H. Lewis.

Hypoproteinemia associated with congestiv heart failure has been recognized for man years, and had been thought to be due mainl to decreased synthesis of albumin by a con gested and perhaps hyoxic liver. Ancillar factors had been thought to include dilutio due to fluid retention, anorexia and malabsorp tion secondary to congestion and stasis in th mesenteric vasculature. Constrictive peri carditis has been reported also to give rise t a nephrotic syndrome which resembles tha of renal vein thrombosis. Although increase nitrogen losses in the feces had been measure in cases of ulcerative colitis in 1937, quantita tive estimation of actual protein or albumi loss could not be made because of the reabsorp tion of hydrolysis products, amino acids an peptides. Use of radioactively-tagged albumi and polymers such as polyvinylpyrrolidone however, permitted measurement of actua gastrointestinal losses of protein. These losse were found to be significant, and even in th normal state accounted for perhaps 50% o the daily albumin degradation. In gastro intestinal disorders, the losses if excessive might easily outstrip the ability of the liver t resynthesize new proteins despite reabsorptio

of the amino acids from the degraded and digested protein, since the liver seems limited to about doubling its synthetic capacity for albumin.

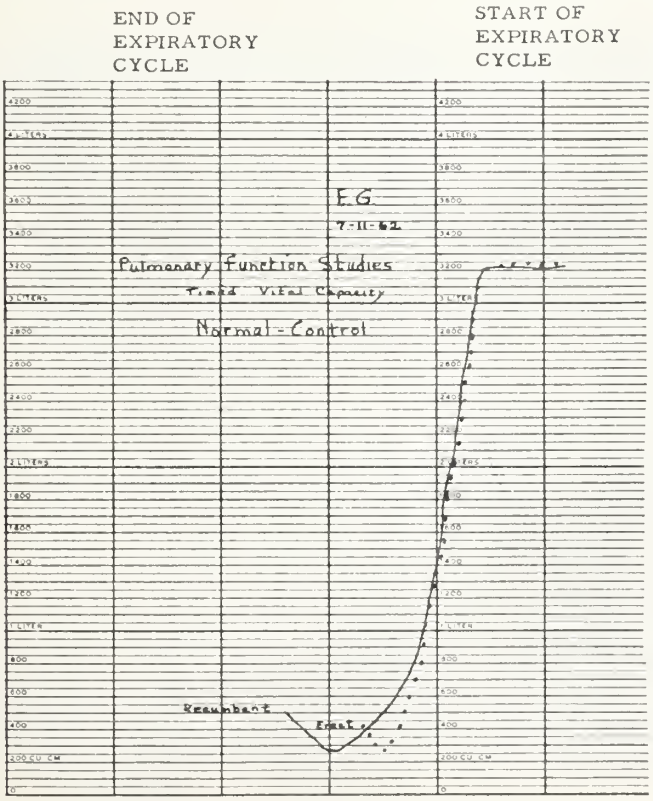
Since the clinical tools for clarifying the question of whether decreased synthesis or accelerated losses are responsible for hypoproteinemic states are now available, it is logical to begin with such a determination in such cases. If accelerated rates of protein degradation should be indicated by such studies, it is clearly worth investigating the gastrointestinal tract as a possible route by which the losses may be occurring, particularly if preliminary evidence has excluded more obvious possibilities, such as nephrotic syndrome, burns, hemorrhage, lymph or pancreatic fistulae. Demonstration of gastroenteric protein loss is not, however, an end in itself, for many of the diseases which give rise to this physiologic disturbance are themselves reversible, such as tropical and nontropical sprue, Whipple's disease, constrictive pericarditis. It is therefore emphasized that demonstration of the syndrome of protein-losing gastroenteropathy is but establishment of an obligation to seek the basic cause, correct it if possible, and thereby abolish or minimize the excessive gastrointestinal degradation of protein, a disorder which is probably much more common than has been suspected.

Abstract 9

SELECTION OF BIOPSY PROCEDURES FOR DIAGNOSIS OF SARCOIDOSIS. Harold L. Israel, M.D., and Maurice Sones, M.D., Philadelphia General Hospital.

1. An analysis has been made of 329 patients with sarcoidosis having a total of 533 biopsies.

2. Biopsy of superficial or palpable lesions,



THE NORMAL "VERTICAL" CURVE

FIG. 1 (Abstract 11)

including cutaneous sarcoids, nasal and conjunctival granulomas, enlarged parotid glands, subcutaneous nodules, and epitrochlear, cervical, inguinal and axillary lymph nodes demonstrated sarcoid granulomas in 87 per cent of specimens.

3. Pulmonary or mediastinal node biopsies through limited thoracotomy incisions yielded sarcoid granulomas in 99 per cent of specimens.

4. Gastrocnemius muscle biopsy demonstrated granulomas in 89 per cent of patients with erythema nodosum or arthralgia, but was infrequently rewarding in the absence of these manifestations.

5. Liver biopsy revealed granulomas in 80 per cent of specimens.

6. Scalene fat pad biopsy demonstrated sarcoid granulomas in 74 per cent of specimens.

7. Taking into account ease of performance, safety and productivity, biopsy of cutaneous sarcoids and palpable lymph nodes and other readily accessible lesions is recommended as the initial procedure. If these are not present or if the initial biopsy is negative, intercostal pulmonary biopsy is recommended when there is diffuse pulmonary disease. If hilar adenopathy is the only abnormality demonstrable, needle biopsy of the liver, thoracotomy, or scalene fat pad biopsy should be utilized.

Abstract 10

RENAL FUNCTIONAL RECOVERY FOLLOWING ANURIA SECONDARY TO RENAL ARTERY EMBOLISM. Albert N. Brest, M.D., Robert Bower, M.D., and Charles Heider, M.D. Hahnemann Medical College and Hospital.

Anuria secondary to renal artery embolism is encountered infrequently. Nonetheless, it is important to recognize this complication promptly since it is a potentially reversible form of renal failure, assuming that rapid surgical intervention can be achieved before irreversible renal damage has occurred. The purpose of this report is to describe a case of

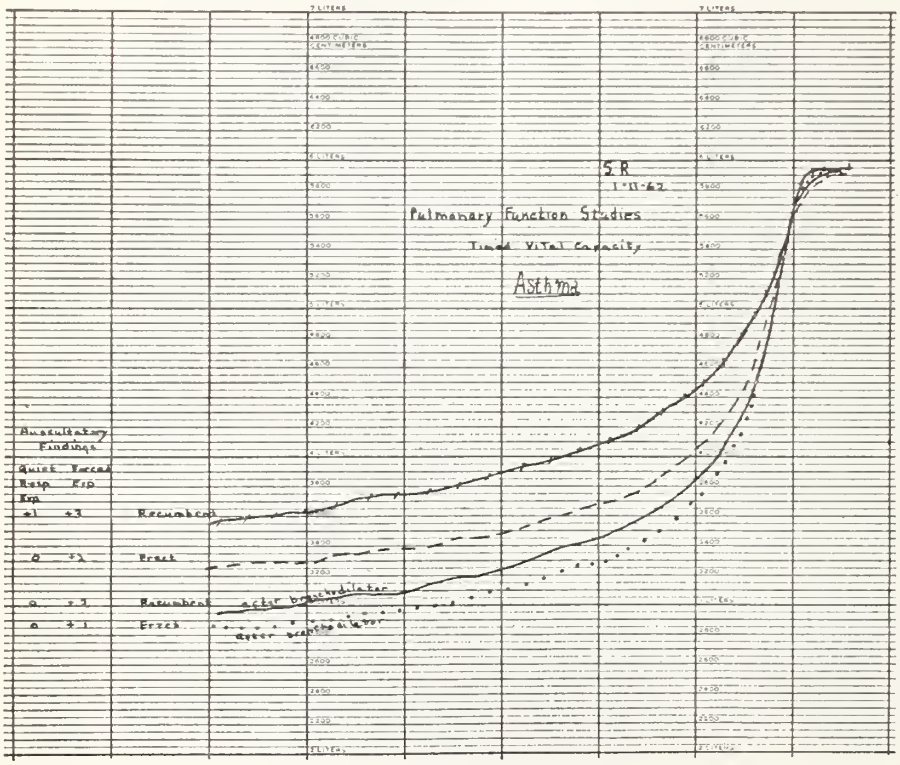


FIG. 2 (Abstract 11)

anuria secondary to renal artery embolism and to discuss the renal functional response which followed embolectomy. The case is of particular interest because of the lapse of more than four days between onset of anuria and subsequent revascularization. Despite the delay in surgical intervention, substantial renal functional recovery occurred.

Abstract 11

A Simple Bedside Ventilatory Test for Bronchial Asthma. Leonard S. Girsh, M.D., and Louis Tuft, M.D. Department of Allergy, Temple University School of Medicine.

The purpose of this study was to show that the clinical application of a simple test, namely, the induction of the asthmatic wheeze through forced expiratory effort and elicited by the use of a stethoscope, yields data equivalent to the timed vital capacity. This method can be readily applied even to a young child since manual compression of the chest wall can serve as a means of inducing forced expiration. Also, during the course of the study, an attempt was made to correlate the asthmatic wheeze with the timed vital capacity and the spirometric tracing after expiration (maximal expiratory flow rate). A positive relationship was found between bronchodilator therapy and improvement in the signs of airway obstruction (the asthmatic wheeze as well as the abnormal timed vital capacity seen in asthma). Similar findings were noted with the patient in the recumbent position, that is, aggravation of the physical sign, the asthmatic wheeze.

Methods and Procedure:

Seventy-two ambulatory asthmatic patients were studied: One hundred healthy college students served as controls. Pulmonary function (performed simultaneously with sound recordings of the chest) was studied in twelve

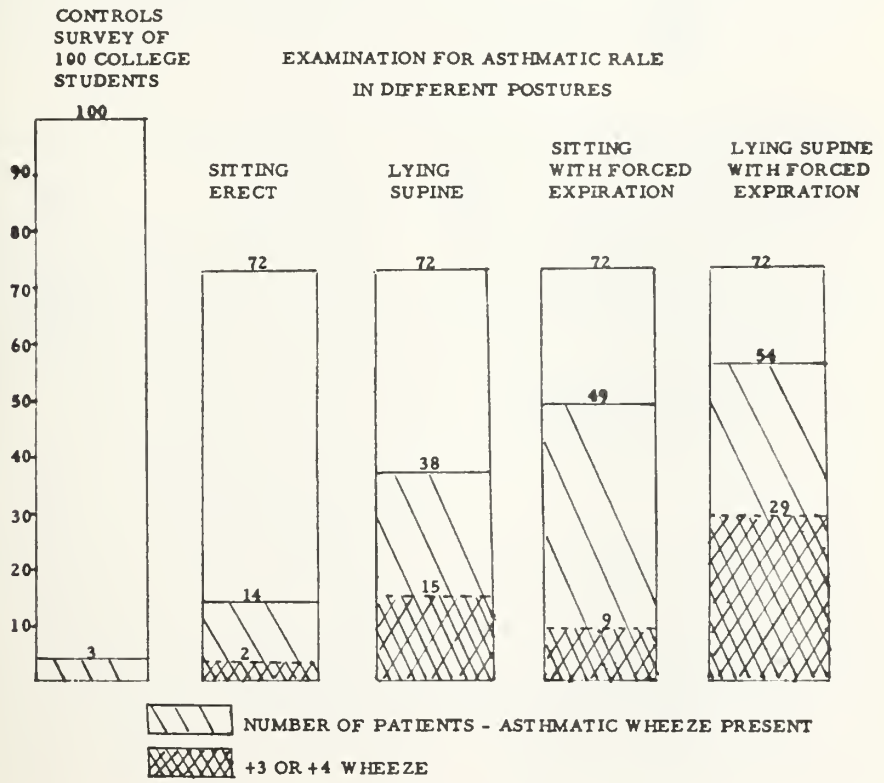


Fig. 3 (Abstract 11)

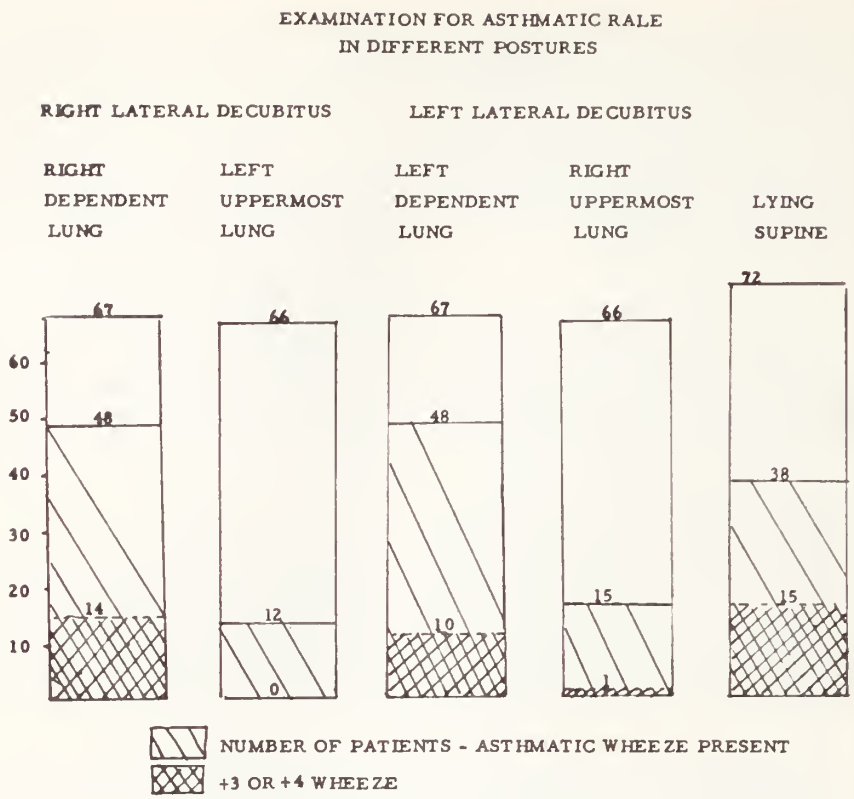


Fig. 4 (Abstract 11)

asthmatic patients and twelve normal patients, using a 9 liter Collins Respirometer; first while the patient was seated, and again with the patient lying flat on an examining table. After such control tests, bronchodilator drugs* were administered. Observations before and after bronchodilator drug therapy* were made to note improvement in airway obstruction as measured by the graded asthmatic wheeze and simultaneously by the timed vital capacity.

Results: (see Figs. 1–4)

1. The graded improvement of the kymographic and auscultatory findings in asthma were as follows—(Fig. 2)

(a) improvement of both where patient assumed sitting position.

(b) further improvement after bronchodilator therapy in the recumbent position.

(c) best improvement noted after sitting position plus bronchodilator therapy.

2. There was almost as much improvement in timed vital capacity and graded wheeze in going from the recumbent to the sitting position in these asthmatic patients as there was from bronchodilator therapy*. The mean improvement in vital capacity by the position change was 370 cc., ranging from 100 to 700 cc. This trend of improvement from recumbent to sitting position was always positive.

3. In the twelve normal subjects the asthmatic wheeze was not audible with forced expiration, even in the recumbent position (Fig. 3). Also, there were only slight changes in timed vital capacity (Fig. 1) and maximal expiratory flow rate. The average change in the normal subject, upon assuming the erect

* Epinephrine (1–1000)—(0.3 cc. in adults, 0.2 cc. in older children); 25 mg. in adults, 15 mg. in children

position from the recumbent position, was 113 cc., ranging from 0–180 cc.

Conclusion:

1. A close parallel has been demonstrated between the expirogram (timed vital capacity, expiratory flow rate) and the expiratory asthmatic wheeze obtained with forced breathing.

4. A simple clinical test is useful to indicate airway obstruction; the auscultatory asthmatic wheeze from forced expiration demonstrates subclinical airway obstruction in asthma, even during symptom-free intervals.

3. The most effective method of eliciting an asthmatic wheeze: forced expiration combined with the flat position, has a useful application in objective diagnostic physical findings in subclinical asthma. This can also be useful in large scale physical examinations, such as school examinations.

4. A simple bedside test of ventilatory function can be used as a means of following and recording objectively, an asthmatic patient's improvement and his response to drug therapy.

Abstract 12

PREOPERATIVE LOCALIZATION OF PHEOCHROMOCYTOMA. Daniel S. Fleisher, M.D., Gerardo Voci, M.D., Samuel L. Cresson, M.D., and Lester Karafin, M.D. Departments of Pediatrics and Surgery, Temple University School of Medicine and St. Christopher's Hospital for Children.

Analysis of the catecholamine content of plasma samples from selective sites in the vena cavae may aid in the localization of pheochromocytoma (von Euler *et al.*, Acta Medica Scandinavica *153:* 127, 1955). Employing this technique in a ten year old boy who had had five tumors removed, but yet had an elevated B.P. and an abnormal urinary excretion of VMA, we were unable to localize residual tumor tissue.

	I.V.C.	I.V.C.	I.V.C.	S.V.C.
Plasma	(Below renal vein)	(Above renal vein)	(Right atrium)	(Right atrium)
Nor-epinephrine (mcg./L.)	9.9	9.8	12.3	12.3

As a more definitive technique, the inferior vena cava, the azygos vein, and both innominate veins were catheterized.

	Azygos	Azygos	Right Innominate	Left Innominate	Inferior Vena Cava
Plasma	(Diaphragm)	(At superior vena cava)			(Right atrium)
Nor-epinephrine (mcg./L.)	15.6	9.3	7.0	7.7	11.9

From these data, residual tumor tissue was considered to be intra-abdominal. At the second operation, seven para-adrenal tumors were removed. In the subsequent nine months, the patient's B.P. and urinary excretion of VMA have remained within normal limits. The latter technique appears to be more valuable in localizing pheochromocytoma than that described by von Euler *et al.*

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Mesenchymal Tumors of the Soft Tissues[1]

By ARTHUR PURDY STOUT, M.D.[2]

IF A tumor involves important organs such as the brain, colon, uterus or breast, if it secretes hormones that produce spectacular effects or if it involves a visible tissue such as the skin where everyone can see it, the amount of study to which it is subjected is enormous; publications multiply, everybody has heard about it and many, quite unjustifiably, consider themselves experts on the subject. But there are some varieties of tumors that are uncommon and unpopular, they receive very little attention and consequently ideas concerning them are nebulous and frequently faulty; as a result they are all too often badly treated. Since they are uncommon this has no noticeable effect on the vital statistics of the population. But the individual is not a statistic; it becomes a matter of vital importance to him and his family whether or not he loses an extremity or his life. The mesenchymal tumors fall into that category and since I am one of the few people who have taken a deep interest in these tumors, I have chosen those among them that involve soft tissues for my topic today.

The mesenchymal tissues include in general the supportive and hematopoietic tissues of the body outside of the central nervous system. Connective tissue, smooth and voluntary muscle, adipose tissue, blood and lymphatic vessels, synovial and mesothelial tissues, the reticulo-endothelial and hematopoietic tissues all fall into this category. They give rise to tumors that are both benign and malignant; the benign ones are usually recognizable as such because the cells composing them resemble normal cells; the malignant ones are less easily recognizable because they produce bizarre caricatures of normal cells. The term sarcoma has usually been used to categorize these malignant tumors. It is generally assumed that sarcomas will metastasize through the blood stream although it is possible for them occasionally to metastasize to the lymph nodes. It is also generally assumed that these tumors can arise in any part of the body and that wherever they are found they will behave in the same fashion.

Ladies and gentlemen, hardly any one of these statements is true. The various tumors are not found in all parts of the body, they do not behave in the same fashion wherever they are found, some tumors are capable of imitating other tumors, there are benign growths that imitate malignant ones and sometimes there are tumors that are composed of a mixture of mesenchymal tissues, and most re-

[1] Thomas Dent Mütter Lecture LXXV, The College of Physicians of Philadelphia, 6 March 1963.

[2] Emeritus Professor of Surgery, College of Physicians and Surgeons, Columbia University, New York 32, New York.

cently it has been determined that the same tumor type may not behave in the same way in children as it does in adults.

It has taken many years for us to become aware of these variations because many of the tumor types are rare and it has been difficult to assemble enough cases with follow-ups to learn of their biological behavior, and also because so few individuals have interested themselves in investigative studies. I think we would still be floundering in confusion were it not for the fact that I had the great good fortune to be associated with a brilliant expert in tissue culture, Dr. Margaret Murray. Somewhat by chance we learned that no matter how much a tumor may differ in vivo from its tissue of origin, when explanted in vitro the growth will betray its true nature by exhibiting the same growth characteristics as the normal cells of its type. In this fashion we were able to demonstrate that the mesothelial cells of the pleura, peritoneum and pericardium do not always make tumors composed of cells resembling ordinary mesothelial cells but can act as fibroblasts and produce fibrous or mixed mesothelial tumors of both benign and malignant varieties (17). In another study she learned that the peculiar cells found in glomus tumors, those little painful growths found occasionally beneath the nails and elsewhere, are pericytes (6). The pericyte is a remarkable cell normally found stretched out over the surface of a capillary. It has contractile powers and controls the caliber of the capillary's lumen. This in turn led to the identification of a fibrovascular tumor called the hemangiopericytoma (16). As a result of identifying this rare tumor type which formerly had been given a dozen different names we have learned its biological variations in different parts of the body for only occasionally does it behave as a malignant tumor. We have also learned that when it develops in the retroperitoneum or the thigh it is much more apt to be malignant and metastasize than when it grows in other parts of the body.

As the result of these and other tissue culture studies we have learned that a great variety of mesenchymal cells can and sometimes do act as facultative fibroblasts (12). I am sure this accounts for the fact that so many different tumors in the past have been called fibrosarcomas. This might not be so confusing were it not for the fact that these masquerading fibrosarcomas will exhibit the growth characteristics of their true cellular type which may be quite different from those of pure fibrosarcomas.

Having separated the pure fibroblastic tumors from their imitators, it was possible to divide them into two groups. One group resembles ordinary fibroblastic tissue that is relatively well differentiated but is usually more cellular than reparative tissue. This variety is often called differentiated fibrosarcoma, but does not deserve to be categorized by a term containing the word "sarcoma" for it is in reality a non-metastasizing growth. In recent years I have abandoned this term in favor of the word fibromatosis (11). The other variety is still fibroblastic but produces fewer reticulin fibers and its nuclei appear anaplastic and show a good many mitoses. This is the poorly differentiated fibrosarcoma and is truly malignant for it can metastasize (13).

I will use in illustration of these two types cases 1 and 2 from a paper dealing with fibrosarcoma that was published in 1948 (10). These two cases contrast the slow growth and infiltrating propensities of the differentiated fibrosarcoma and its failure to metastasize over a very long period of time contrasted with the anaplastic appearance and ability to metastasize of the malignant poorly differentiated fibrosarcoma.

In recent years I have become interested in all of these mesenchymal tumors in children. It is well known that some tumor types are more malignant in children than in adults, such as rhabdomyosarcoma and osteogenic sarcoma. On the other hand malignant melanoma is far less malignant in children than in adults. Later I shall deal with this subject regarding a number of different mesenchymal tumors but at this time we are discussing the fibrous growths. In Table 1 is an analysis of

TABLE 1

FIBROUS TUMORS IN CHILDREN

	Number	Known Metastases	Known Dead
Fibroma and keloid	25	0	0
Fibromatosis and Differentiated Fibrosarcoma	289	1	7
Pseudosarcomatous fasciitis	39	0	0
Undifferentiated fibrosarcoma	23	2	3
	376	3	10

TABLE 2

COMPARISON OF FIBROUS TUMORS IN ADULTS AND CHILDREN

	Cases	Metastases	Died Tumor
Differentiated Fibrosarcoma (Fibromatosis):			
Adults	104	0	4 (3.8%)
Children	232	1	4 (1.7%)
Malignant Fibrosarcoma:			
Adults	41	10 (24%)	21 (50.1%)
Children	23	2 (8.7%)	3 (13%)
	400	13 (3.3%)	32 (8%)

the benign and malignant varieties of pure fibrous growths in children. In effect the fibromatoses are not truly metastasizing growths and if they cause death it is because of unchecked invasive growth. The one exception in a child was an innocuous appearing growth in the thumb of an eight-year old girl. Six years later there were similar histologically innocuous appearing masses in both lungs (8). These may have been multiple tumors instead of metastases and as we now have 289 cases of fibromatosis and differentiated fibrosarcoma in children without known metastases I think of fibromatosis in both adults and children as a benign type of growth. For malignant fibrosarcoma it will be seen from Table 2 that this tumor is somewhat more malignant in adults than in children.

TABLE 3

	Fibromatosis	Malignant Fibrosarcoma
Omentum	2*	1
Mesentery	12	0
Retroperitoneum	16	1†

* Small chance findings at laparotomy.
† With hypoglycemia.

There are many other interesting features concerning fibrous growths which are hard to understand but which are worth knowing. It is astonishing to me how infrequent pure fibrous growths are in the omentum, mesentery and retroperitoneum. Table 3 shows this in graphic form.

No review of the fibrous tumors would be complete without mention of the extraordinary pseudoneoplastic lesion called pseudosarcomatous fasciitis. This peculiar growth was first described in a publication by Konwaler, Keasbey and Kaplan in 1955 (5). It consists usually of a rather small nodule that appears suddenly without warning in various subcutaneous areas but most frequently in the forearm. It increases rather rapidly, is occasionally painful or tender and usually gets removed within three months of its first appearance. It is composed of a peculiar myxoid fibroblastic tissue which infiltrates and is accompanied by inflammatory cell infiltration and some capillary proliferation about the periphery. The rapid growth is generally indicated by a number of mitoses. It is astonishing not only because it has so frequently been mistaken for a malignant tumor but also because it is apparently quite a recent development. I have not been able to detect any cases of this sort in our files prior to 1948. Up to the first of December 1962 we have records of 210 cases. Thirty-nine of these have been in children. The lesion is apparently benign for I know of no case that has metastasized or died, although about ten per cent of them have recurred. It is almost entirely limited to the body surface including the mammary gland but we have observed cases in the trachea and carina. Its

etiology has not been investigated but most cases are not related to trauma.

Another recent fibrous tumor of novel and hitherto undescribed features has been called elastofibroma dorsi by two Finns, Järvi and Saxén (3) who first reported it in 1961. This peculiar tumor develops in only one definite spot in the body. This is in the lower subscapular space under the rhomboideus and latissimus dorsi muscles and it has been observed only in elderly men and women. It may be unilateral or bilateral, grows slowly apparently without symptoms and is usually discovered by chance. The tumor is composed of connective tissue fibers which in many instances are partly or wholly replaced by elastin capable of digestion by elastase (9). It seems astonishing that such a strikingly peculiar growth should only be found in one location in the body and to me even more astonishing that before very recent times nobody should have recognized and reported it. In spite of all the many observations of tumors in the last century and a quarter, it is evident that there still remain unrecognized types of fibrous and other mesenchymal growths.

As a further illustration of the misuse of the word "sarcoma" I should like to call to your attention the word leiomyosarcoma. This term is a most deceptive one for like the term fibrosarcoma it includes a great many tumors that are not malignant at all. The smooth muscle cell has a great capacity for disguising itself in tumor growth. Ordinarily it closely imitates the normal smooth muscle cell with myofibrils. When it grows in tumors, the cells and their nuclei may align themselves in more or less parallel rows. Unfortunately the Schwann cells of nerve sheaths do the same thing when they grow in tumors. Since this performance on the part of Schwann cells is much better known and the similar action on the part of smooth muscle cells often forgotten, the two tumors are frequently confused. Another way in which smooth muscle cells disguise themselves is by assuming a rounded appearance. A favored place where this may occur is in the stomach. In a recent study (14) of 69 cases of the rounded cell form of smooth muscle tumors in the stomach, 35 different diagnoses were suggested including 5 varieties of epithelial tumors and fibrous, neurogenous, lipoblastic, mesenchymal, vascular, bony, chordomatous, reticular, lymphomatous as well as smooth muscle tumors. Fifty-four per cent thought the tumors were malignant and 45 per cent considered them benign (Table 4). Actually of course they were all smooth muscle tumors and all but two were benign. The cases came from 23 states and the District of Columbia in this country, and from Canada, Colombia, Argentina, Italy and Israel outside of it. Since the completion of this paper 28 additional bizarre smooth muscle tumors of the stomach have been received in our Laboratory making a total of 97 including two in children (18). Why this should occur so much more frequently in the stomach than, for example, in the uterus is extremely difficult to understand. I have not recognized more than 5 in the uterus, 7 in the intestinal tract, none in the skin, 4 in the mesentery, 2 in the omentum and 6 in the deep soft tissues. Thus this peculiar variant of a smooth muscle tumor appears to be four times as frequent in the stomach as it is in all the rest of the body put together. I have cited this as an example of the difficulties encountered by the average pathologist in trying to make accurate diagnoses on mesenchymal tumors. It is extremely difficult to recognize

TABLE 4

108 Diagnoses Suggested for 68 Bizarre Smooth Muscle Tumors of Stomach

	Benign	Malignant	Uncertain	Total
Fibrous Tumors	1	2	0	3
Neurogenous Tumors	8	8	3	19
Lipoblastic Tumors	0	2	0	2
Mesenchymal Tumors	0	4	0	4
Vascular Tumors	12	7	0	19
Muscle Tumors	17	13	1	31
Epithelial Tumors	2	9	0	11
Miscellaneous	3	2	1	6
No Diagnosis			13	13
	43	47	18	108

malignant smooth muscle tumors because so many of the benign tumors develop misshapen bizarre cells that are mistaken for evidence of malignancy. Actually the vast majority of internal smooth muscle tumors are benign. Smooth muscle tumors in the skin are almost invariably benign but in the superficial soft tissues they display a high degree of malignancy. Some 53 per cent of the leiomyosarcomas metastasized and the death rate was probably higher (15). One can suspect malignancy if the mitotic rate rises above 12 in 50 high power fields but even the true leiomyosarcomas are not always fatal even if there are metastases or mesothelial implants. This experience with smooth muscle tumors is an excellent example of how much must be known about them in order to interpret their probable behavior and degree of malignancy. Since they are rare tumors this knowledge is not known or appreciated by the majority of pathologists and therapists.

Obviously it will be impossible to discuss all of the many varieties of mesenchymal tumors and tell you of their idiosyncrasies of behavior and location. I would like, however, to bring to your attention a comparison of the behavior of a number of varieties of the malignant mesenchymal tumors in children less than 16 years of age with similar tumors in adults. Probably the majority of pathologists, surgeons and pediatricians have assumed that they are equally or more malignant in children than they are in adults. When I looked for studies dealing with this subject I found that there was none. Therefore with the assistance of a number of younger associates, there have been assembled as many cases as were available of the various mesenchymal tumors, for comparison with similar tumors in adults. The results of investigation are recorded in Table 5. It must be pointed out that this table is incomplete and tentative. Several varieties are missing from it; the lymphomas and rhabdomyosarcomas in particular. I do not believe a comparison is possible for rhabdomyosarcomas because the children's tumors are quite different from those of adults. About the malignant

TABLE 5

Comparison of Death Rates of Uncommon Mesenchymal Malignant Tumors of Soft Tissues in Children 0–15 Years with Those in Adults

	Infants 0–5		Total Children		Adults
	No.	Died	No.	Died	% Died
Fibrosarcoma (undifferentiated)	10	1	23	3 (13%)	17.2
Liposarcoma	6	0	13	0	32.
Leiomyosarcoma—Personal	4	1	10	1 (10%)	44.
—Reported	18	14	31	17 (55%)	—
Malignant Fibrous Xanthoma	0		5	1 (20%)	—
Malignant Histiocytoma	1	1	3	2 (67%)	67.
Malignant Hemangioendothelioma	7	4	14	4 (28%)	63.
Hemangiopericytoma	18	2	31	6 (19)	18.
Kaposi's Sarcoma	11	2	40	7 (17.5%)	50.
Myxoma	5	0	27	0	0
Synovial Sarcoma	7	2	21	9 (43%)	76.6
Osteogenic & Chondrosarcoma	4	3	11	7 (63.6%)	80.
Malignant Mesenchymoma	23	7	42	18 (43%)	60.
Total	114	37 (32.5%)	271	75 (27.7%)	
Total (excluding reported leiomyosarcomas)	96	23 (24%)	240	58 (24%)	

fibrous xanthomas, histiocytomas and osteogenic and chondrosarcomas of the soft tissues, the numbers are so few that they are without significance and beyond the fact that there are such malignant tumors in both adults and children that have proved fatal, no comparison is possible. The tumor types in which there is a significant difference in favor of children are liposarcoma, Kaposi's sarcoma, synovial sarcoma, malignant mesenchymoma and malignant hemangio-endothelioma. In regard to leiomyosarcoma if the comparison is made between adults and children with the bladder and prostate excluded, the figures favor the children; if the bladder and prostate tumors of children are included, the figure for children rises markedly. There can be no satisfactory comparison here for adults very rarely have leiomyosarcomas of the prostate and bladder. As for malignant fibrous tumors, the figures favor children but there is so little difference that it may not be significant.

I am afraid that the subject is so highly technical that those of you who are not pathologists interested in tumor diagnosis must feel that we are floundering in a sea of uncertainties and that the opinions which we express concerning any given case are unreliable and untrustworthy. In my experience things are not quite as bad as that. If a pathologist is reasonably well trained he will usually make a correct diagnosis and there now exist in the literature a series of studies dealing with the diagnostic features and recorded behavior of a majority of the soft tissue tumors in adults and children. Both the pathologist and the therapist can refer to these when faced with the necessity of deciding how to treat a given case.

In a recent paper Dr. George Pack (7) criticized surgical pathologists for making suggestions as to how a case should be treated based upon the pathological diagnosis alone. He intimated that the surgeon, radiotherapist and chemotherapist were better qualified to select the proper treatment than the pathologist and that the pathologist should confine himself to making a diagnosis. Like a good many other dogmatic statements, this one is neither wholly true nor wholly false. If the term used in diagnosis has a standard meaning which is accepted and used by everyone, this might have some justification but unfortunately there are no universally accepted standard terms. In the early part of this lecture I indicated that the word fibrosarcoma does not mean the same thing to everyone and requires interpretation. The adjective malignant also needs interpretation when applied to individual tumors, for to some it may mean a potential metastasizer by embolism and to others it may be applied also to a non-metastasizing neoplasm but one that is a vigorous infiltrater. I think Dr. Pack is justified when he criticizes a pathologist for telling a surgeon how to apply the techniques of his treatment. On the other hand I think it is part of the pathologist's duty to explain the probable behavior of a tumor if not treated at all, if inadequately treated and if given radical treatment. The pathologist generally does not know the patient and his reaction to life, nor does he know the relatives and the other social and psychiatric relationships of the patient; all of these may have an important bearing on the treatment of a given case. When Dr. Pack criticizes some pathologists for making suggestions as to treatment from material sent through the mail from a distance, I think he must forget that the majority of surgeons in smaller communities cannot possibly have the vast experience of a George Pack in cancer surgery and they need to have some help in planning treatment. I am frequently consulted by mail from distant places and I feel it is my duty to outline what I know about the nature and expected behavior of the tumor so that the therapist may have some guide to intelligent treatment. Of course in doing this I have to depend upon the information furnished me by the inquirer, which may not be accurate. But oncology is as yet far from an exact science and until it becomes one mistakes will be made. How can it be otherwise when I tell you that although I have been interested in oncological pathology for 54 years hardly a day goes by that does not bring to my attention some phase of the subject I have never before encountered.

I think it must be clear to you that the accurate diagnosis, estimation of malignancy and prediction of probable behavior of these mesenchymal tumors is frequently extremely difficult. The century of study to which they have been subjected has enabled pathologists to arrange them into more or less recognizable groups, but having mastered this one must learn where they are apt to be found and how the behavior of each type differs in various regions as does their relative frequency. Since the diagnosis of this group of neoplasms forms only a very small part of a hospital pathologist's activity I am not surprised at the feeling of helpless bafflement which comes over him when faced with the necessity of making a diagnosis and estimation of probable behavior. He may choose one or another of the following procedures: make a positive unequivocal diagnosis, make a tentative diagnosis, make no diagnosis because he does not know and seek consultation. He consults others and often finds that there is disagreement among them. This forces him to report no diagnosis or select the one that most appeals to him. It is obvious that our knowledge concerning these mesenchymal tumors is still incomplete and our ability to recognize them subject to far too much error. I do not anticipate much improvement in the near future unless a better and more reliable method of diagnosis is developed.

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Nutrition Surveys Co-Sponsored by Our Government in Foreign Lands[1]

By RICHARD A. KERN, M.D.[2]

I AM most appreciative of the signal honor which has been done me in my selection for this lectureship. The long list of my distinguished predecessors is to me at once a source of wonderment, challenge, and, may I confess, not a little worry and perturbation.

I was particularly pleased to be asked to tell about the program of nutrition surveys mentioned in the title, because that program is making a significant contribution to a much larger effort by many agencies of many lands on a world-wide scale to meet a major, perhaps *the* major challenge facing mankind today: the feeding of its teeming billions. The story should be told and retold, not just because it is an interesting story, or because as citizens we may be proud of it, but because the larger effort demands our growing understanding, concern and support.

It has been my privilege to play a miniscule role in the nutrition survey program, but I hasten to disclaim any special qualification as an expert in nutrition. I have been merely a member, and a minor one, of a large team of workers in various fields and disciplines who have played a part. However, my contact with the program has been frequent, almost from its beginning, and in many aspects and places, so that I am sufficiently informed to tell its story.

When the Reverend Thomas Robert Malthus in 1798 published in London his first essay on the Theory of Population, the estimated number of inhabitants of this world was one billion. A hundred years later they had increased to one and a half billions. Today the figure stands at three billions. Given today's trends, a conservative estimate for the year 2000—which many of you will witness—is 6.3 billions. Little wonder that people speak of a world-wide population explosion.

But I am more in accord with Dr. René Dubos' assessment of the situation when he speaks of a population avalanche. An explosion expends its force equally in all directions from a center. An avalanche concentrates its devastation locally and selectively: and in this instance, not only in the areas of greatest population densities, but in those areas least able to cope with it, the underdeveloped countries.

The Malthusian doctrine, so-called, has been much discussed and generally misquoted in these 165 years. The usual version has been that the limits to population will eventually be set by the limited quantities of food that man and the earth can produce. The critics of the doctrine have maintained that improved technology in food production and the use of huge untapped areas of fertile land will outstrip population growth in the foreseeable future.

But Reverend Malthus was thinking not so much of the world at large as of what he saw and anticipated in a London that was just beginning an unprecedented population growth in the wake of the industrial revolution. His melancholy view was that the masses were increasing at a rate which was and always would be ahead of their ability to provide an adequate standard of subsistence.

Certain it is, that in many lands the problem of feeding the people is growing apace. In some of them, it is clear that to solve the problem an increase in food supply must also be attended by a control of population. In at least one country, Japan, this has come to pass in the

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current decade. Reverend Malthus would have counseled continence. The Japanese practiced abortion.

Above all, the problem is one of *today*. Of the 3 billion people in the world today, only 800 million are well nourished and 200 million are on marginal diets. One and a half billions are mal-nourished, half a billion are always hungry, and this year 25 millions will die of malnutrition.

Hunger is as old as the race. For primitive man it was a grim day-to-day struggle for survival, with the occasional feast on kill or harvest, and longer famine. Hunger and malnutrition were the rule. Only slowly and slightly did he modify this over the years by preservation and storage of food against the lean months and years, and by driving his growing flocks over vast distances of marginal lands—as much as a thousand miles in a year.

For even when Malthus wrote in 1798, the picture was still much as it had been. By far the great majority of all mankind were engaged in the task of food production: most people were subsistence farmers, producing enough for their own survival and a scant surplus for the non-farming minority. The diets of all the world were basically much alike: a caloric intake furnished mostly from cereal grains: rice, wheat, maize, barley and a few others. There was little or no food processing and preserving as we know it today. A season of drought, a crop failure, a pestilence in flock or herd, and hunger was inevitable. And when war was abroad in the land, there always rode with him the three other horsemen: famine, pestilence, and death.

Early in the nineteenth century, and increasingly ever since, a number of nations: those of Europe, North America, the island countries of the Pacific, have adopted new and more efficient methods of food production. What happened since then has abundantly proved this all-important concatenation of facts: *nutrition is basic to health, and health is basic to production, and on production depends the standard of living that is requisite for happiness*. For in those countries, with better nutrition there came better health and production, freeing increasing numbers for industrial purposes. Fewer and fewer farmers could feed, and do it better than did their forefathers, more and more industrial workers, whose output in turn made possible the high and nation-wide standards of living of today that a century ago were undreamed of.

But these nations, it must be repeated, are still in the minority. We, in the technologically advanced nations, and whose chief nutritional problem is obesity, find it hard to realize that twice as many people lack adequate nutrition and, largely in consequence, adequate health. In particular do they lack adequate protein in their diets: a major cause of poor development, chronic illness, high death rates and slow economic process.

One can only hint, in the time available, at some of the complexities of the problem. The burden on the food producer in the countries with malnourished inhabitants is all the greater because in addition to those normally unable to produce: the children and the aged, he must provide for the ill as well.

Protein malnutrition particularly involves two segments of the population and at, for them, critical periods: the small children after weaning and before they are allowed the food of adults, and the women during pregnancy and lactation. The infant mortality in the first year of life has been largely controlled, even in the underdeveloped countries, through modern medical knowledge. But disease among the weanlings and thereafter is as high as ever. Fed on a diet largely of starch, and deficient in milk, meat, poultry, fish, eggs and good legumes, they grow slowly, develop edema, big livers, depigmented scant hair and all the other features of kwashiorkor, a disease we never heard of in our student days. These youngsters are sitting ducks for every infection they may encounter. As many as half of them die before they reach school age.

Not the least difficult aspect of correcting such childhood malnutrition lies in the habits, customs, superstitions and malpractices inherent in local cultures.

Nor is it easy, or at times feasible, to change an agricultural pattern from cash-producing crops to crops of nutritive value.

I hope that I have said enough to convey at least an inkling of the nature, magnitude and urgency of some of the major nutritional problems of our time. Let me now mention briefly a very few of the many practical approaches being made toward their solution.

Under the aegis of the United Nations, there are many on-going efforts that bear directly or indirectly on nutrition.

Early in the field was *UNICEF*, the feeding program for infants and children, a most timely and effective agency.

Then there is the *World Health Organization* (*WHO*) with which you are of course familiar. Its many public health programs are contributing to increased agricultural as well as industrial production by extending the period of productivity of the workers and by decreasing the absenteeism from field and factory because of illness. Moreover, by controlling certain disease vectors, such as mosquitoes and the tsetse fly, they have extended the acreage available for food production.

I wish to mention at more length the *Food and Agriculture Organization* (*FAO*) of the United Nations. (If you read the Spanish edition of Reader's Digest, its January number has a fine article about it.) FAO began around 1952 as an advisory agency to collect and supply information, statistical data and practical advice. Today it can implement some of its recommendations through the *Technical Assistance Program* and a *United Nations Special Fund*. It is now active in 104 countries. Its able director is Mr. Binay R. Sinn, of India, and one of that country's former ambassadors.

The objectives of FAO are, *first*, *more food production*, through improved methods, irrigation, drainage, fertilizing, mechanization, better seeds, breeds more suitable to climate and soil, reforestation, improved methods of fishing in coastal regions and of distribution into the interior; *second*, *better food processing*, with better methods of preserving to prevent losses through spoilage and deterioration and to even out seasonal fluctuations in food availability and insure an even supply of needed nutriments between harvests and so to stabilize prices; *third*, *better food distribution; fourth*, *control of plant and animal diseases*, and *fifth*, the *training of indigenous personnel*, both in and out of government, in these various programs. The last is of prime importance, for, as Mr. Sinn has stressed, the major effort must come from within each country.

FAO has chalked up some striking successes. Here are a few. Egypt has tripled its rice output. Ceylon has added to its productive acreage 30,000 square kilometers of land that before was barren. In Cambodia, as a result of improvements in feeding and stock, the production of eggs is up 50 per cent. In Brazil, the cattle raisers are achieving a five-fold increase in grass yield per acre and a four-fold increase in beef production. The shepherds of Nepal have improved both the quality and quantity of butter and cheese output of their herds, thanks to techniques taught them by Swiss experts sent by FAO. The Sudan has added over 300,000 square kilometers to its productive acreage, so that it no longer needs to import rice.

Now, lest these names of far-away places convey a wrong impression of a lack of any immediate concern of their problems with us here at home, let me show how our nutrition in the United States ties in with conditions in Africa, where this College has more than a passing interest. A few weeks ago, Col. F. D. Mauer, VC, U. S. Army, in an address at the Armed Forces Institute of Pathology in Washington, called attention to our present worries over certain animal diseases in Africa that could threaten our food supply in the United States. For every four individuals of our population, we have in this country 2 cattle, 1 sheep, 1 pig and 2 chickens: a domestic animal population that exceeds 275 millions. We already have, in 13 of our States, a disease of sheep and goats called "blue tongue". It is transmitted by the same gnat which transmits African horse sickness, fatal to 80 to 90 per cent of horses not

protected by vaccine. African horse sickness has already spread to Turkey and India. Then there is African swine fever, for which there is as yet no vaccine: it is 100 per cent fatal to pigs, is transmitted by contact, and has recently spread to Spain and Portugal. Then there is Rift Valley fever, a disease of sheep, cattle and man, and we have in the United States two types of mosquitoes which can transmit it.

At this point let me bespeak your considered judgment on the safety of, as well as the need for, pesticides in modern agriculture and disease control. I do so, because you have all been exposed recently on the front page of your morning paper to the serial publication of Rachel Carson's book, "*Silent Spring*", an emotional appeal against the use of pesticides, which allegedly destroy our song birds and wild life, upset the balance of nature, and constitute a dangerous health hazard to our people. We most certainly do need these chemicals which have been major contributors to modern progress in food production and disease control. Of course, there are precautions that must be used by those who handle pesticides, and there must be, and there is, surveillance over residues on foods that they be harmless, and there is constant search for new pesticides of less and less toxicity for man and animals: and this was true long before the publication of this book. Of course, accidents can happen through carelessness, but that possibility surely does not constitute a valid reason for banning an agent: aspirin has killed twice as many babies at the hands of their mothers than the farmers' children who died from careless exposure to pesticides; and it was table salt that killed the babies in the Binghamton Hospital when accidentally substituted for sugar in a milk formula. As for the unfavorable effect on wild life, far more harm has been done by the felling of forests, draining of swamps, and tilling of fields than by pesticides, which even in this country never reach 95 per cent of its area. Agricultural scientists, experts in nutrition and public health administrators are agreed that never has our food been better and our health and life span in a more favorable state than today. I agree with the closing words of William Darby's review: "The responsible scientist should read this book to understand the ignorance of those writing on the subject and the educational task which lies ahead."

Let me now draw your attention to some of the research aspects of the subject. In each of the many disciplines concerned, and at every turn, there are unanswered problems that run the gamut from the simplest need for the gathering of factual material, through various intricacies of applied investigation and basic research. In consequence, there are developing research programs in many fields and in many places and under many auspices, including the United Nations agencies which I have mentioned, and various agencies of our own government in bilateral activities with other countries. The nutrition surveys of which I shall presently speak are essentially such applied research efforts. But first let me refer to two others which relate to the pressing and serious problem of protein malnutrition that I mentioned earlier.

In 1956, the National Research Council of the American Academy of Science, under its then president and former Philadelphian, Detlev Bronk, established a *Research Committee on Protein Malnutrition*. Its members are known to many of you, and one of them is a Fellow of this College: they are William Henry Sebrell, Jr., William Darby, Grace Goldsmith, Paul Györygy, Guido Edward Hilbert, James Hundley, Glen King and Nevin S. Scrimshaw, and also one representative each from FAO, WHO and UNICEF. One aspect of their interest has been a search for an effective, palatable, cheap, protein food-supplement with which to combat protein malnutrition, especially in small children and in pregnant or lactating women. Many products have been studied and in various places, and some are now in small-scale production.

A great step forward in this field was achieved at the Nutrition Institute for Central America and Panama, established in Guate-

mala City under the auspices of the Kellogg Foundation, with a Guatemalan staff and on grounds adjacent to the Medical School and Hospital of Guatemala. Its director until recently was Nevin S. Scrimshaw, now at the Massachusetts Institute of Technology. One of its very capable junior staff is a graduate of Temple Medical School in 1956: Werner F. Ascoli. The Institute is best known by the initials of its Spanish name: *Instituto de Nutrición para Centro-América y Panamá*, INCAP, for short. There they have developed a low-cost versatile cereal type of food, rich in protein, based on cottonseed, cornmeal, sorghum grain and yeast, and enriched with vitamin A and calcium carbonate. Its flavor is palatable and very acceptable to the maize-accustomed peoples of Central and South America. It is now in commercial production under the name of *Incaparina*. A quantity which equals in calories and exceeds in protein a liter of milk costs less than 5 cents to produce and sell. An unexpected by-product of its usefulness came to light in the Franklin D. Roosevelt Hospital of Guatemala University. It is well known that attempts to raise the blood protein level of cirrhotics with less than 3 grams per 100 ml. by pushing the intake of conventional proteins will precipitate hepatic coma. During my stay there last April I saw two cirrhotics in whom the feeding of Incaparina had produced prompt and significant rise in blood protein level with no strain on liver function.

In the Republic of Korea there existed in the early 1950's a serious problem of malnutrition that resulted in the rejection, for military service, of 52 to 55 per cent of young recruits. The study of this problem by using a multidisciplinary approach, begun by the Department of Defense in association with the Department of Health, Education and Welfare and others was the beginning of the *Nutrition Survey Program* of which I shall now tell you. Its chief protagonist and guiding spirit was Harold R. Sandstead, Ph.D., brilliant biochemist and student of nutrition. It was he who drew up the plan for conducting a survey of all factors entering into the nutrition picture of a large segment of a population. The plan continues to this day, with modifications and improvements based on a growing experience, in the *Manual for Nutrition Surveys*. His untimely death was a grievous loss to the whole world. It occurred on November 1, 1955, while on his way from Denver to Seattle on a survey-connected mission, when his plane was destroyed in mid-air by the bomb which a man had put in his mother's suit case that he might collect her insurance.

ICNND, the *Interdepartmental Committee on Nutrition for National Defense*, brought into the study and correction of malnutrition in a country, a new approach: a new and continuing program, significant in its effectiveness far beyond its expenditure of men, money and materials. The chief things that are new, significant and effective in the program are these: 1) a sponsorship, on the part of the United States, by joint and correlated efforts of departments and agencies that had heretofore independently pursued their several interests bearing on many aspects of nutrition; 2) a survey program that involves a multidisciplinary approach: clinical, dental, dietetic, biochemical, food-technological, agronomic; and which can define a country's major nutrition and feeding programs and formulate practical recommendations to insure maximal use of local resources for their solution; 3) the training of indigenous scientific and technical personnel in all aspects of conducting a nutrition survey, including the biochemical procedures in a laboratory erected and left in the country surveyed, so that the study of nutrition should there be a continuing and growing effort; and finally 4) the establishment, in the surveyed country, of a similar interdepartmental committee of governmental agencies, but with the added participation of the Ministry of Education, to sponsor an ongoing program in nutrition.

The initial push that got things started was the requests by the governments of Iran and Pakistan in 1955 for help in evaluating the nutrition and feeding problems of their armed forces. A nutrition survey program was then

developed as a part of the *U. S. Military Assistance Program*, with support from the Department of Defense and the Department of Health, Education and Welfare. In that same year, 1955, there was organized the *Interdepartmental Committee on Nutrition for National Defense*: the collaborating agencies being the Department of Defense, the Department of Health, Education and Welfare, the State Department, the Department of Agriculture, the International Cooperation Administration (now called the Agency for International Development) and, eventually, the Atomic Energy Commission. The officers were Dr. Frank B. Berry, Assistant Secretary of Defense (Health and Medical) Chairman; Dr. Floyd S. Daft, Director of the National Institute for Arthritis and Metabolic Diseases, vice-chairman; and Dr. Arnold E. Schaefer, former first assistant of Harold Sandstead, the executive secretary. Among the members of the Committee is our former townsman and Fellow of this College, Dr. Howard T. Karsner. The Committee has been assisted and advised over the years by an imposing array of consultants from colleges, universities and governmental agencies who are specialists in nutrition, medicine, dentistry, biochemistry and food technology.

The success of the first surveys was significant. In addition to the strictly scientific data, there accrued intangible results of incalculable value.

It should be stressed that a survey is undertaken only at the request of the foreign country. The program is then on a people-to-people, and a scientist-to-scientist basis, which engenders mutual understanding, confidence and respect. It is a cooperative effort in training and research, in which both sides have gained much in experience and new knowledge.

It has thus been possible to expand the surveys, originally conducted only on military units, to all strata and groups of the civilian population as well.

To date, surveys have been completed in 22 countries. Beginning with Iran, Pakistan and a re-survey in Korea in 1956, there followed in 1957, Libya (the first in which civilians were also studied), the Philippines and Turkey; in 1958, Alaska (those studied were only Eskimos and Indians), Ethiopia and Spain; in 1959, Ecuador, Peru and Vietnam; in 1960, Chile, Colombia, Formosa and Thailand; in 1961, Lebanon and a Group of Islands of the British West Indies: Trinidad, Tobago, Nevis (where Alexander Hamilton was born), St. Kitts, St. Lucia, and Anguilla; in 1962, Bolivia, Burma, Malaya, Jordan and Uruguay. Today several additional surveys are in preparation or under study.

Let me now trace for you the *course of events* and *procedure of a typical nutrition survey.*

1) The first step is an *official request*, through diplomatic channels, by a government for help in an assessment of the nutritional status of its people. Upon approval of this request by our State Department, the ICNND, through its Executive Director, Dr. Schaefer starts action along several lines.

2) A *Nutrition Survey Team* is organized. Typically, this consists of about 12 U. S. specialists (there have been as many as 19 and as few as 4): 3 to 6 clinicians (internists, pediatricians, gynecologists), 2 to 4 biochemists, 1 or 2 dentists, 2 nutritionists, 1 or 2 experts in food technology and agronomy, at times a statistician, often a photographer. The size and composition of the team will vary, depending on anticipated local problems and on the personnel that the host country can furnish. The Team Director is usually a clinician with special qualification in nutrition and with previous survey experience. The Assistant Director is usually the Chief of the Laboratory. To date, about 370 persons from some 38 colleges and universities and from several departments of government have served as surveyors, over 50 of them in 2 or more surveys.

3) *The equipment and supplies for use by the Survey Team* are assembled and packed. These include such things as scales to weigh people and food, all instruments for routine physical examinations, electrocardiographs, portable dental chairs, containers for laboratory speci-

mens, Waring blendor for food samples, punch cards for recording data, emergency medical supplies, photographic equipment and film, medical texts, color transparencies of lesions, laboratory manuals and much else: more is the wonder that so little is occasionally forgotten or missent.

4) The equipment and supplies for setting up and running a *clinical nutrition laboratory* are assembled and packed. This laboratory is planned to do these routine determinations: on *blood*, hemoglobin, hematocrit, serum cholesterol, lipids and lipoproteins, protein electrophoresis, total protein, albumen, carotene, vitamins A and C; on *urine*, creatinine, thiamine, riboflavin, N′-methylnicotinamide, iodine and sodium; on *stool*, ova and parasites. Occasionally also, other examinations are provided for. This laboratory is operated throughout the survey, and at the end is presented to the government of the host country for continued use as a nutrition laboratory.

5) The *host country* is advised as to the *commitments which it must make.* These include a) *Scientific Personnel for the Survey Team:* people with training in the several disciplines represented by the U. S. Team Members, so that a number of scientists and technicians of the country are working side by side with the U. S. personnel in the field and in the laboratory, in every phase of survey work, so that they can carry on such work in the future. To date over 1000 indigenous personnel have so served; b) a *permanent site for the laboratory*, in an environment that shall be most conducive to its continued future function in a nutrition program; and c) *logistic support.* This is mainly the providing of transportation within the country, for moving the clinical team from place to place and for daily delivery of supplies to the team and of specimens back to the laboratory. It sounds simple, but this is the toughest part of the entire job.

6) The *initial planning visit* is made to the country a few months before the actual period of the survey. This calls for nice timing: it must be long enough in advance to be sure that the necessary preparations will have been made by the time of the team's arrival, but not too long, lest there be a change in regime, with new incumbents in high offices who are not inclined to honor the commitments of their predecessors. This visit must be made by those who can speak with authority: usually the Chairman of ICNND, Dr. Berry, the Executive Director, Dr. Schaefer, and the U. S. Ambassador. The negotiations are carried out at the highest levels to insure future cooperation: therefore with the Ministers of State, of Defense, of Health, of Agriculture, of Education. It is at this time that are sown the seeds of what should be a continuing interdepartmental cooperative effort by their several departments. For on such cooperation will depend, not merely the success of the survey, but the future implementation of its recommendations. The very nature of the survey fosters closer cooperation, integration and understanding among their agencies as well as our own. This is the new leaven that leaveneth the whole lump.

Through the ambassador, one also contacts the agencies of our government and of the United Nations that are operating in the country: the Embassy staff, the Military Aid Group, World Health Organization, Food and Agriculture Organization, UNICEF, and others.

An important decision to be made at this visit is the selection of the *permanent site of the laboratory*. This is a juicy plum, much desired by many. It should go where it can do the most good, preferably in an academic or equally favorable scientific environment: an institute for nutrition, if there be one; a major public health laboratory, a basic science department of a medical school and university.

Not to be overlooked in the selection of the time period, 8 to 12 weeks, when the survey is to be made, are such things as holidays, long vacations or leave periods, military maneuvers and other events that would be a major road block to the survey. Also to be taken into account are conditions of climate, harvest and religious observance that might influence the program. In the month of Ramadan, Muslims do not eat or drink between sun-up and sun-

down. But Turkey asked that the survey be done at this time to see if there were any significant differences between those who observed Ramadan, and those who did not. (There were none.)

The final act of the initial planning visit is to instigate the appointment, by the several cooperating governmental agencies in the host country, of a *technical working group* of indigenous personnel: people who are familiar with the geography, population groups, food habits, customs and production, and specialists in transportation and logistics.

7) The Team Director and his Assistant now get into the picture, and with the help of the just mentioned technical working group of indigenous personnel, undertake the *planning of the survey*. They select the areas and population groups to be surveyed, so as to be representative and proportional to the total population, taking into account regional factors, ethnic groups, occupation, economic status, age and the like. In each place, strict attention must be paid to randomization in selection of households, families and individuals. A military commander always wants his best units studied to impress his superiors. A social worker wants the poorest specimens put forward to win sympathy and help. A tentative schedule of survey sites and dates is set up, so that transport, supply and lodging can be arranged for. In each area, some one: a health officer, or a clinic chief, or other responsible local official, must be notified as to what will be needed, and when.

8) In the meantime, the team members at home are notified to come to the "*Stone House*", Dr. Schaefer's department, at National Institutes of Health, Bethesda, for a *briefing and indoctrination session* that lasts 3 days. In advance of this they have been reading much informative material about nutrition surveys, and about the country where they are going. There are *general sessions*, addressed by representatives of ICNND, the State Department, NIH, the Walter Reed Army Institute of Research, UNICEF, the Agency for International Development, the Peace Corps, the International Center for Medical Research and Training, and various others. There are *special group sessions*: the clinicians are shown color slides of lesions to be looked for; the laboratory team is given final instructions; the dietitians and food technologists hear about the things they are likely to encounter. Above all, the team members meet each other: new friendships are begun, old ones renewed.

9) Finally the big day comes. The first to go are the Team Director and Assistant Director, the senior staff and the laboratory group. Busiest on arrival are the laboratory people, for they must get their equipment out of customs, and set up the laboratory, without which the survey can not begin. Usually something has been forgotten: electrical outlets, taps and sinks, hoods or closet space. In the midst of making up solutions, some belated workman starts chipping plaster on the overhead and the first batch of solutions is ruined.

The most harassed person at this stage is the Team Director. There are "protocol" visits at inopportune times. Administrative details are hindered by the unexpected lack of an interpreter. The local technical personnel need to be met and instructed in survey methods. The promised transportation has not been firmed up because someone forgot to pass the word to the military. Letters may have gone to survey sites in the hinterland, but no answer has been received, and no one has visited those distant points to see about local arrangements. (I mention these things, because by reason of previous experience, linguistic propensities and military training, I have been useful on occasions as an aide to the Director.)

10) A week or so later, the rest of the team arrives on the scene. There now are made the assignments of each to his task, and techniques are reviewed, this time together with the local team members. After a few days, there is a "dry run", and then the survey is ready to begin.

The first day of survey is usually carried out in a near-by *military unit*, where persons to be studied are easily available and from where it

isn't far to the *laboratory* for delivery of specimens.

This diagram (Fig. 1) shows the essential features of the *lay-out* and the *flow pattern*: one large room, or two or more adjacent smaller ones: it could be a mess hall, a recreation room, a school room, an out-patient clinic, a public health center, an empty hospital ward.

At the appointed hour, the team and all its gear roll up in bus, pick-up truck, jeep or staff cars: whatever is available. Within a few minutes things are set up and the first person is brought in.

The *clinical team* does physical examinations. They are of two types, *abbreviated* and *detailed*. Eighty per cent are of the short type that can be made without the disrobing of the subject. The data are entered on this *short form* (Fig. 2) and include height, weight, hair, eyes, mouth, teeth, neck, thyroid, skin, reflexes, and so on: a total number of 19 items is included on this card. One in every five persons is diverted from

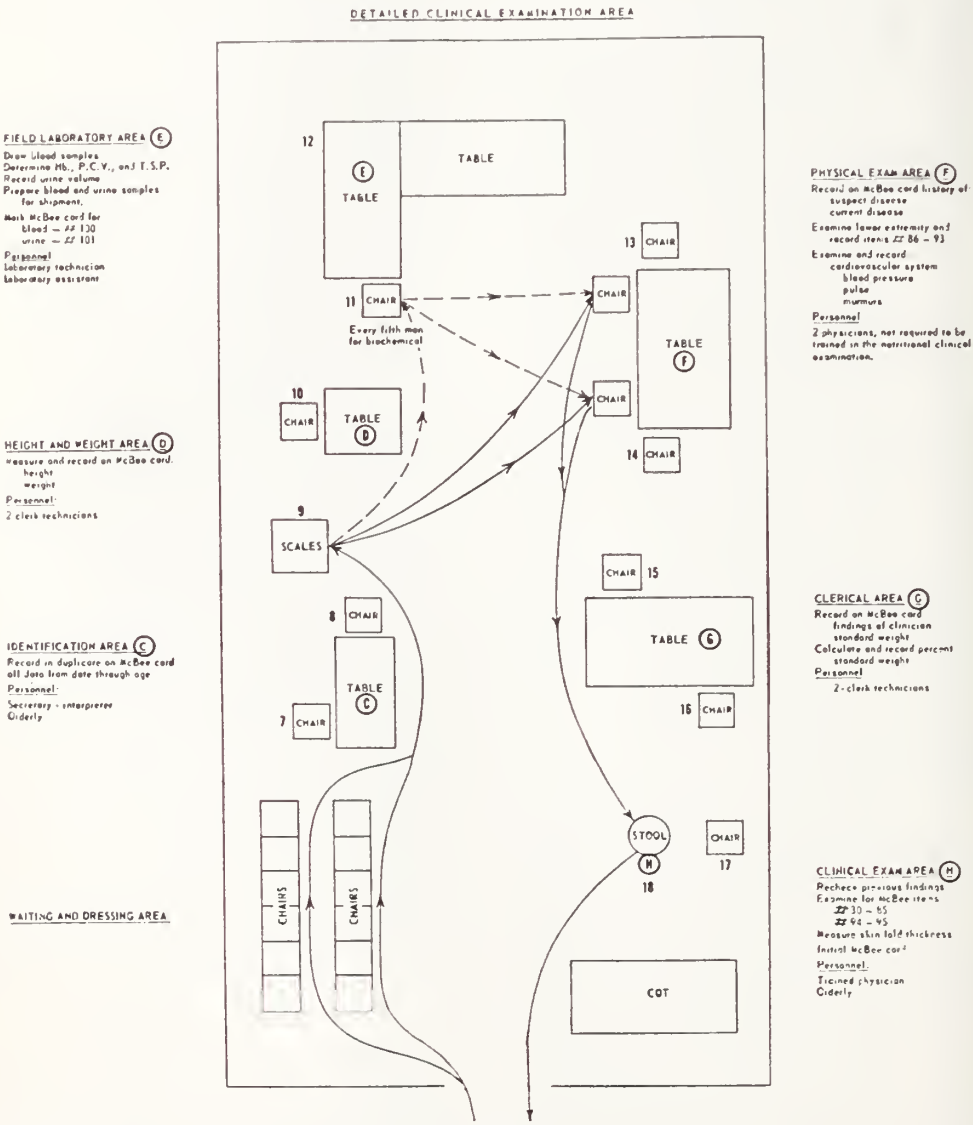

FIG. 1

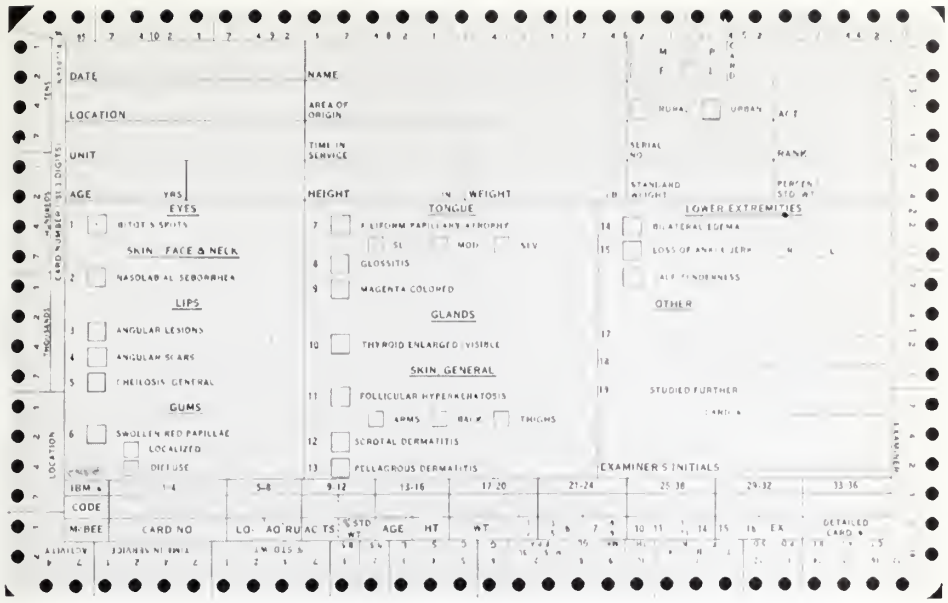

FIG. 2

the main stream flow for the *detailed* examination, done in a screened area on partial disrobing. This *long form* (Figs. 3, 4) carries over 100 items that are checked and recorded. In addition, these persons get the detailed *dental* examination which the dentist records on a special form (Fig. 5). At least one in every 5, sometimes one in every 3, or even one in 2 of those getting the detailed examination also furnishes blood and urine samples for the routine analyses mentioned earlier under the laboratory potential, and the results are eventually entered on the appropriate part of the long form (Fig. 6).

Of course, there are new items that come up from time to time, items of special interest in a particular country, or in an age group, or a new method or technique to be tested: an unusual prevalence of a disease that might have nutritional aspects (anemia, for example), or sugar-tolerance tests in an aging population, or electrocardiographic findings that might correlate with high-fat diets or blood pressure levels: no two surveys are quite the same. There is room on the cards for coding additional material, or a special card may be used for specific purposes.

The finding of a lesion, striking, or dubious, may call for a conference, at times for a color photograph for future reference.

Each of these record forms is a *McBee Punch Card*, serially numbered for the whole survey. Each night, team members have the assignment of "punching" the various entries. The importance of this procedure for statistical analysis is obvious.

There are clearly many factors that can influence the validity of the survey. Since most sources of error arise in the clinical area, I shall mention some of the more important ones at this point. The selection of the population sample must be made by those with knowledge of the country and its people, and by those with statistical training, who work out a program of correct randomization to designate the house or family in an area whose members are to be examined, or the last digit of a record card, of those who are to get detailed or special examinations. Some errors are minimized as the number of examinations increases. However, this is not as important as one might think: the percentage of error varies as the square root of the number of observations. Thus, quadrupling the number of examinees only halves the error.

Therefore it is neither practical nor necessary

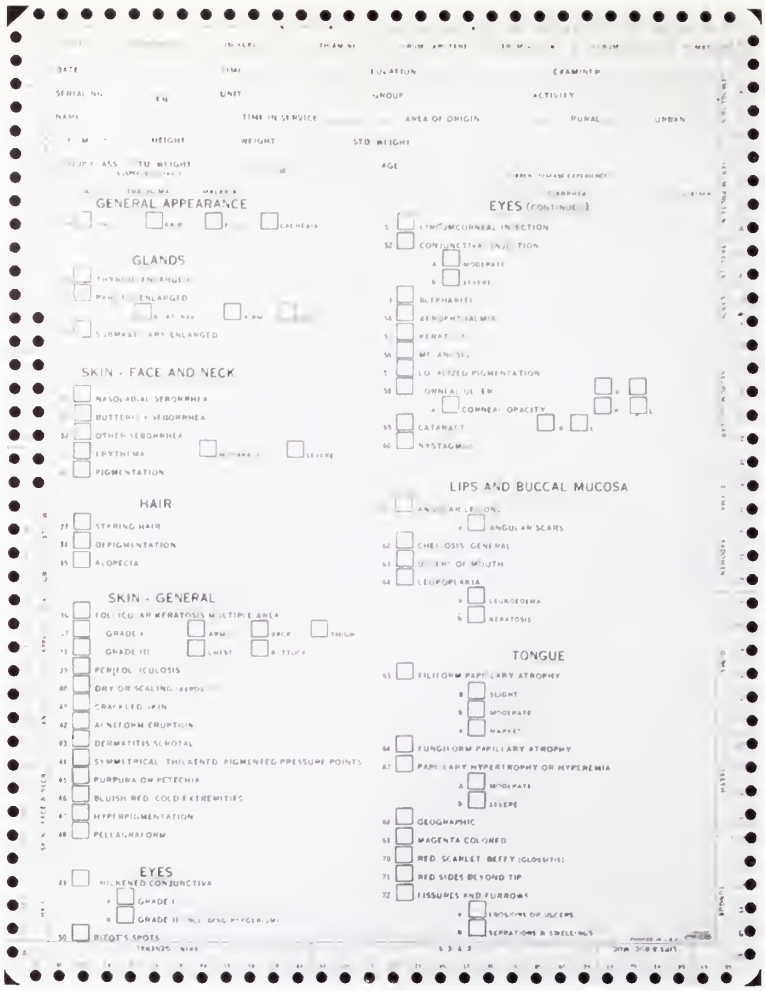

FIG. 3

to examine more than some 10,000 persons in a country, 2000 or 2500 in detail, to get a valid result, and half that number could still be adequate. The clinical team can check at least 150 and up to 300 persons in a single day. This could mean as many as 30 blood and 30 urine specimens: an overload for the laboratory, especially at the week-end! This is why the time required to conduct the survey in a country is around 8 weeks, give or take a week or so, depending upon the time needed to move the team from place to place.

An important source of error that is not related to the size of the sample is the difference from one examiner to another in assessing the *degree* of a certain sign or lesion. Especially at the beginning, but also from time to time throughout the survey, there must be evaluations of examiners by comparing their several recordings of the same group of examinees selected by the team director as referee. The extent to which some examiners can vary from the mean is astonishing, especially to the examiner!

The *dietitian team* does a food intake study. Its work begins at the same time and place as the clinical team. It seeks and records facts and data on actual kinds and amounts of food consumed per capita per day; data on food costs, methods of preparation, storage and distribution. The actual procedure depends on the locale of the study.

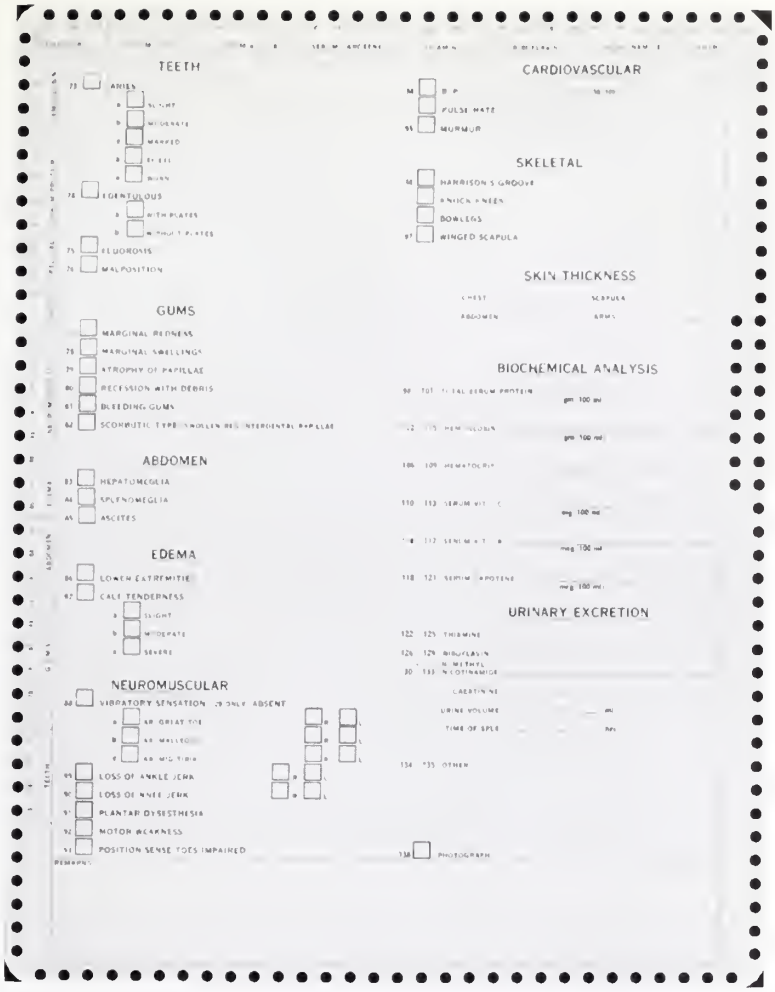

FIG. 4

In a military unit, this can be done more easily and directly, since the military have available records on supply, and since large numbers of persons are fed from a single galley and in a single messroom. The team follows an outlined program to determine the intake of nutriments, the food habits, food availability and supply, ration allowance, methods of food procurement, messing procedure, amounts used or wasted, food inventories. Someone watches every stage of procedure from food procurement, through preparation and cooking, serving and consumption, and amount of waste and garbage, and mode of disposal. Samples of meals are taken and blended for eventual analysis. (Such samples are flown back to Bethesda for this purpose.)

In the diet survey of civilians, a different approach is needed. This begins with the questioning of the person responsible for feeding activities in the family: usually the wife and mother. The first information sought is a *24-hour recall* of food purchased and its cost, the food prepared and eaten at the several meals of the day and by whom. This calls for tact and understanding by the women members of the team, in order that they may now ask in a certain percentage of instances to go to the home of the person interviewed to watch her prepare the evening meal. Having gained such entreé to the home, they next arrange to

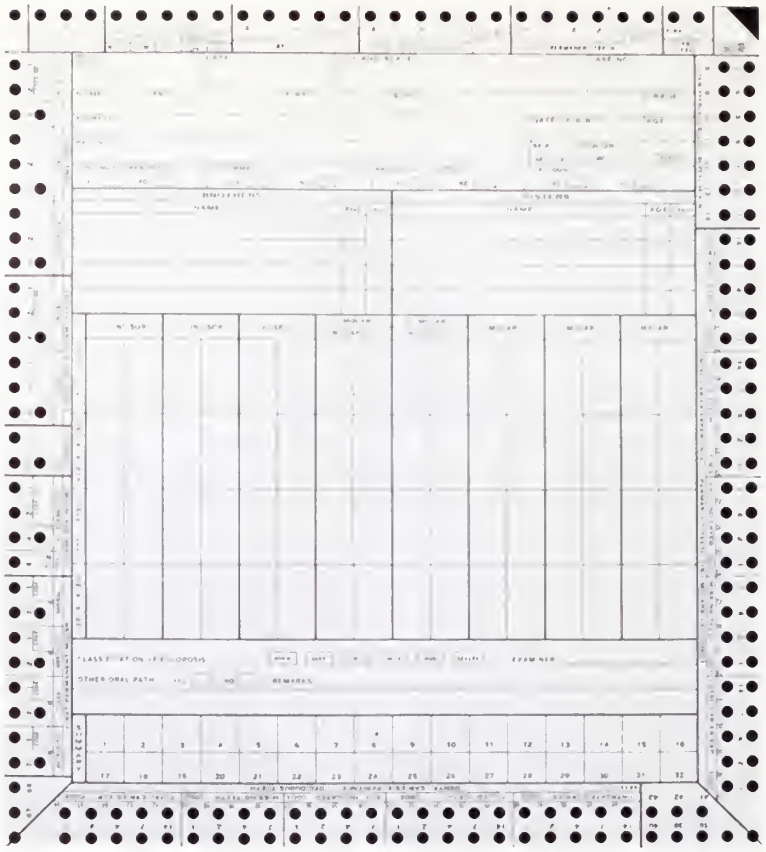

FIG. 5

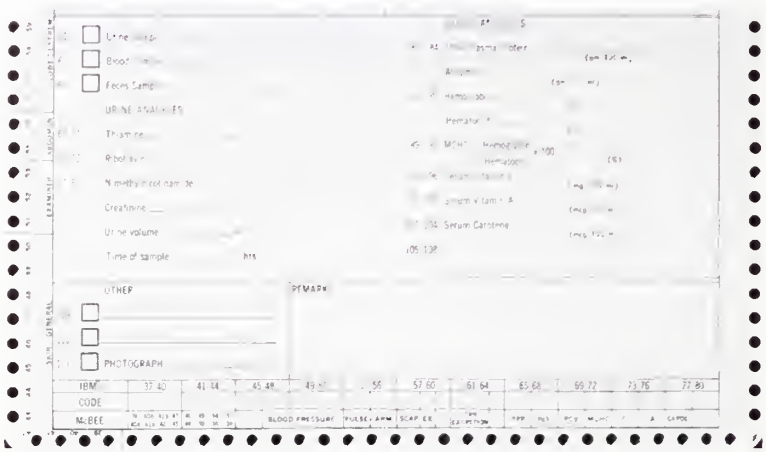

FIG. 6

come the following morning to see the preparation of the morning and noon meals, and such "watching" includes measuring, weighing, recording and the collection of proper samples for eventual analysis. The dietitian team's workday can begin before 5 in the morning and end late at night. In Uruguay, for example, diet histories were obtained in 952 families whose persons included 91 per cent of the population sample, and detailed studies and 24-hour food

composites were obtained in 66 homes. Cooperation by the civilians is generally excellent, and is usually a little better in rural than in urban areas. Thus in only one section of Montevideo did 5 families refuse to cooperate in any aspect of the survey (giving as their reason the fact that they were communists), while up to 97.8 per cent cooperated in one rural area.

When surveying is being done in a large city, or populous area, the team can be lodged for a week or longer in a hotel, and move out each morning to the city area or suburb or barracks for that day's work and then back to the hotel in the evening. But when the survey moves into the remoter and rural areas of a country, then the clinical and dietary teams, with their equipment, must be moved from place to place, for one-, two-, or three-day stands in a region. The logistic problems can be imagined when 27 people of various categories of nationality, rank, status and sex must be housed in a town or village whose largest hotel may have only a dozen rooms, or where no hotel exists and a school building has to be taken over for a few days.

The survey team may travel up to 10,000 miles within a country to as many as 52 sites: perhaps 5000 miles by air and another 5000 by every conceivable means of transportation: jeeps, trucks, buses, horses, boats and canoes. Here one must pay an admiring tribute to the Armed Forces of the host countries for the efficient way in which they manage to meet these transportation needs: pilots, planes, drivers and vehicles. A word of commendation also goes to the team members who cheerfully make these treks under conditions in which comfort is the least consideration, and the term "primitive" applies equally to roads, subsistence and sanitation.

The laboratory crew has the advantage of staying in the metropolitan center, somewhat tempered by having their rooms cluttered with the gear of the team in the field.

The *specialist in food technology* and the *agronomist* follow quite a different pattern. They begin with visits in the Ministries of Agriculture and Economics, to get the proper introductions. Then comes the gathering of basic data on agricultural and food production, supply, costs, imports, marketing, storage and refrigeration. Next come visits to all kinds of food-handling and food-processing facilities: canneries, dairies, abattoirs, fishing wharves, bakeries, cold storage plants, grain elevators, salt refineries, filtration plants, fertilizer plants; visits to the Quartermaster Departments of the Armed Forces and scrutiny of their food regulations and controls. At each point, questions are asked, photographs taken, significant formulae obtained, samples of significance acquired, and at all stages assesments noted for potential improvements.

Collateral information to be gathered during a survey includes data on education in medical, dental, nursing and sanitary fields, public health organization, military medical and paramedical services and hospitals, medical problems of importance in the country. Early in the survey, opportunity is sought to show our members of the clinical team examples of disease entities which they may not have seen before: leprosy, yaws, gangosa, beriberi, Chagas' disease and other conditions which might possibly be encountered during the survey.

My own assignments on surveys have been on the fringes of several of the activities I have mentioned. Early, I have helped the Team Director in getting things organized. At opportune times I have gone to medical schools and hospitals, to public health departments and clinics, and arranged for team clinicians to see cases of interest and importance. With the military, I talked logistics, transport and supplies: cots and blankets, mosquito nets and freon bombs. In visits to Ministries and Chancellories I could lend a proper seasoning of rank and senility to the requests of more knowledgeable but young staff members. In all of this, not the least of my usefulness lay in a modicum of linguistic competence. This also took me into many food-processing plants and activities to interpret for our technical experts. When things had got started in the metropolitan area, I could go into the various outlying regions, accompanied by a food technologist, to visit and contact future survey

sites and personnel, and to help the technologist make his contacts.

At this point, I mention a most important aide and guide to all hands at every step and stage of the survey: *The Manual For Nutrition Surveys*. Conceived and begun by Dr. Sandstead in 1955, its first provisional edition came out in January, 1956, two months after his death. Since then it has been the constant care and responsibility of Dr. Schaefer. To him I gladly acknowledge my indebtedness over the years, and especially in the preparation of this lecture, to this Manual and his numerous reports on the survey program. The provisional edition was field-tested in the surveys made in 1956 and early 1957. The first definitive edition came out in 1957. It has been translated into Spanish and French. The second edition, under revision for some time, is now about to appear (April 1963).

The Manual defines its purposes as these: 1) to establish uniformity of methods, technique and procedure; 2) to serve as a reference book on known facts in nutrition; 3) to serve as a guide for the interpretation of data: dietary, biochemical and clinical; 4) to be a guide to team members as to their duties; and 5) to train local personnel.

There are chapters on *Sampling*, discussing methods, and types of error; *Clinical Examinations*, with full instructions on the use of the McBee Cards; *Biochemical Methods*, for the use of the laboratory personnel; *Dietary Studies:* the instructions for the dietary team; *Guide to Standards* in economics and agriculture for the agronomist; *Food Technology*: items to be considered and recorded; *Supplemental Data* to be collected on civilian and military health statistics, services and education, religious and cultural influences. The final chapter on *Laboratory Equipment and Supplies* is a complete inventory, including amounts and costs, of everything in the laboratory that serves the survey team, and in which the local personnel trained during the survey can carry on the work in the future.

The closing days of the survey period are spent by team members in working on records, picking up loose ends (including last-minute shopping) and working on some aspect of what will be the *Report* on the survey.

All survey data are returned to the secretariat, ICNND, at Bethesda, where they are collected, analysed and assembled into a *Preliminary Report.*

This preliminary report then goes to the country surveyed for comment by its survey team and for discussion and comment by its officials of interested governmental departments: Defense, Agriculture, Health, Economics, Education. This additional material is then incorporated into a *Final Report*, which therefore is a joint effort of scientists and officials of both countries. In each instance, there is prepared a *translation* of the final report into the language of the country or into a tongue of major local usefulness.

The *Final Report*, which takes a number of months to produce after the survey is ended, is a formidable document that may run to some

TABLE 1

DIETARY STANDARDS

(Calculated for a 25-year old male, 170 cm. tall, weighing 65 kg., active, in a temperate climate, on a varied diet)

Nutrient	Deficient	Low	Acceptable	High
Protein (gm./kg.)	<0.5	0.5–0.9	1–1.5	>1.5
Ca (gm./day)	<0.3	0.3–0.39	0.4–0.8	>0.8
Fe (mg./day)	<6	6–8	9–12	>12
Vit. A (IU/day)	<2000	<3500	>3500	>5000
Thiamine (mg./1000 cal.)	<0.2	0.2–0.29	0.3–0.5	>0.5
Riboflavin (mg./day)	<0.7	0.7–1.1	1.2–1.5	>1.5
Niacin (mg./day)	<5	5–9	10–15	>15
Vit. C (mg./day)	<10	10–29	30–50	>50

TABLE 2

BIOCHEMICAL STANDARDS

Analysis	Deficient	Low	Acceptable	High
Blood:				
Hemoglobin (gm./100 ml.) (sea level and 5000 ft.)	<12 <12.3	12–13.9 12.3–14.2	14–15 14.3–15.6	>15 >15.6
Hematocrit (sea level and 5000 ft.)	<36 <38	36–41 38–43	42–45 42–47	>45 >47
Pl. Protein (gm./100 ml.)	<6	6–6.4	6.5–7	>7
Pl. Vit. A (mcg./100 ml.)	<10	10–19	20–50	>50
Pl. Carotene (mcg./100 ml.)	—	20–39	40–100	>100
Pl. Vit. C (mg./100 ml.)	<0.1	0.1–0.19	0.2–0.4	>0.4
Urine:				
Thiamine (mcg./gm. Creatinine)	<27	27–65	66–130	>130
Riboflavin (mcg./gm. Creatinine)	<27	27–79	80–270	>270
N'Methylnicotinamide (mcg./gm. Creatinine)	<0.5	0.5–1.59	1.6–4.3	>4.3

hundreds of pages. There are before you a number of them, which together with a copy of the *Manual*, I am pleased to deposit with the Librarian of the College as a part of the record of this occasion.

The report begins with a *Summary of the findings* of the survey, and a *list of recommendations* based thereon. Then follow, in full detail, the *tabulated results* of all aspects of the survey, and a discussion of each set of statistics, their considered significance, and the indicated corrections.

It can be said with increasing assurance, as the experience has grown, that the data collected make possible a valid assessment of the nutritional status of a population. The diet intake measurements, of course, indicate only the nutrients of the day. The biochemical tests are the consequences of food intakes in the immediate past. The clinical examinations, on the other hand, reflect nutritional effects produced during much longer periods preceding the examination. Taken all together, and in the light of the activity required of the individual, they make possible a highly practical estimate of dietary adequacy or the lack of it.

For the record and the interested reader, there are included at this point three *Tables*, taken from the *Manual*, setting forth the chief criteria used in evaluating survey findings, namely 1) *Dietary Guidelines*, 2) *Biochemical Guidelines* and 3) *Physical Examination Guide.*

It is beyond the scope of this lecture to go into any details as to the *findings* in the various countries surveyed. Those findings run the gamut of nearly all conceivable defects in nutrition, and from trifling to serious in degree. Many of them confirm and extend the observations of previous lesser surveys or those restricted to limited fields. Some findings are new, or enlarge existing knowledge, or point the way to problems for future study.

Much the same can be said with regard to disease conditions encountered: some purely nutritional in origin, others of complex etiology but with a nutritional component, and some of unknown significance.

Simple or complex *avitaminoses* were more frequent in the peoples that live largely on highly polished rice and without proper supplemental measures. This was most obvious in the civilian populations, to a lesser degree in the military, in Vietnam, where thiamine deficiency was the outstanding one; also in Thailand was this true. *Vitamins A and C* were marginal in some groups, low in others, especially in Jordan. *Rickets* was commonest in Libya, and there easiest to correct, by simply exposing infants more to sunlight in that sunniest of countries.

TABLE 3

PHYSICAL EXAMINATION GUIDE

Nutrient	Physical Sign	Abnormal
Calories:		
Obesity	Skin Thickness:	
	Scapulae	>Over 30 mm.
	Lower axillae	>Over 25 mm.
	Height-weight tables	Over 10 per cent
Leanness	Skin Thickness:	
	Scapulae	<Under 8 mm.
	Lower axillae	<Under 8 mm.
	Height-weight tables	Under 10 per cent
Protein	Dependent edema	Over 0 per cent under age 50 in absence of beriberi and starvation
Vitamin A	Follicular keratosis of arms	>Over 5 per cent in adults
Thiamine	Absent Achilles tendon reflexes	>Over 1 or 2 per cent
Niacin	Tongue lesion more advanced than hypertrophy of papillae at tip	>Over 5 per cent
	Reddened tongue	>Over 1 or 2 per cent
	Pellagrous dermatitis	>Over 0 per cent
Riboflavin	Angular stomatitis	>Over 5 per cent in non-denture wearing population
	Conjunctival hyperemia (circumcorneal injection)	>Over 5 per cent
	Magenta tongue	>Over 0 per cent
Ascorbic acid	Red hyperemic gums	>Over 5–10 per cent (in adults)
	Perifolliculosis	>Over 0 per cent

Inadequate protein intake was no problem in Uruguay, with a meat consumption of 240 pounds per capita per year, but an important factor in many other lands.

Total caloric deficits were consistently related to economic factors, but in an irregular fashion. In Chile, a rapidly increasing population, a major currency inflation and a feudal system of land holding have combined in the course of the last 30 years to produce a 10 per cent reduction in per capita income. But it is the children who have suffered a disproportionately greater caloric as well as nitrogenous deficit. A similar caloric and nitrogenous deficit exists, but in a lesser degree, in other Andean countries: Bolivia, Colombia, Peru and Ecuador. In Ecuador this may be offset by wider use of two remarkable plant foods there present: *chocho*, a legume with twice the protein content of peas and beans, and one-and-a-half times that of soy bean; and *quinoa*, especially rich in calcium and with more nutriments than most cereals.

There is an old saying that God sent the food and the devil sent the cooks. *Overcooking* was a common cause of deterioration of certain nutriments, aided and abetted by using copper kettles inadequately tinned. Especially in some military messes did they begin to cook both the evening and the noon meals at the same time in the morning.

Dental caries showed many interesting correlations. There was, of course, abundant evidence of the relation of caries to fluorine in soil

and water. There was also strong correlation between caries and sugar in the diet. In the dental survey, each person examined has put into his record his *DMF number* (decayed, missing, filled teeth). In Thailand, with high fluorine and low sugar intake, the DMF figure for the 20 to 29 year age group was a fabulously low 0.84: less than one dental casualty in each 32 teeth, and many a mouth with a complete perfect set. In the West Indies survey, where the fluorine content was found low and the sugar intake high in every island—St. Kitts raises only a single major crop: sugar—the caries incidence was overwhelming and many young were edentulous. In Jordan and Spain fluorine content was high and caries were low. In Chile there were considerable regional differences that correlated with fluorine content, but in addition, some areas with moderate amounts of fluorine had lower caries incidence than some with more fluorine: this difference was apparently related to milk consumption, since less fluorine seemed to protect when milk consumption was low. (Parenthetically, one was reminded in every country surveyed of the tragic need for dental care and help.)

Goitre, as expected, was very frequent, 35 per cent and more, in the mountainous plateau countries: Colombia, Ecuador, Peru, Bolivia, Chile; and fairly frequent in the highlands of Turkey, Pakistan, Thailand and Vietnam, and Lebanon had a 45 per cent incidence. It was unexpected that all parts of Uruguay had considerable goitre (over 30 per cent) and some parts up to 60 per cent. The goitre incidences all correlated with lack of iodine. It was significant that in many places moderate thyroid enlargement was accepted as normal even by physicians. The madonnas and saints portrayed by most artists in Andean areas have obvious goitres.

Anemia was a frequent finding in certain countries, but its etiology was very varied. In Lebanon and Colombia it appeared to be essentially due to an iron deficiency. In Peru and Ecuador there were both iron deficiency and much intestinal parasitic infestation to account for the anemia. In the West Indies, iron and other deficiencies combined with hookworm to cause the anemia. In Chile, inanition and extensive enteroparasitism were responsible for much anemia. In Vietnam, anemia was frequent and complex, with local variations. Yet in Alaska, with much parasitism (39.5 per cent of Diphyllobothrium infestation) there was no anemia, probably because of high protein intake and good nutrition. Indeed, the Eskimos and Indians examined, mostly national guardsmen on temporary active duty, displayed an excellent adaptation to unusual conditions: they had no inanition, anemia or cardiovascular problems, their blood cholesterol, lipids and fatty acids were all normal. But a high rate of dental caries was appearing in places because of the increasing introduction of sugar. Lest anyone think of amebiasis as a tropical infestation, these Alaskans had an *Entameba histolytica* rate of 8.5 per cent.

Radio-active fall-out in food is also a subject of study by ICNND, and food samples from the surveyed countries are being analysed at Bethesda with this in view. Of some 200 radioactive substances formed when bombs are exploded, only 4 have wide-spread significance by reason of their distribution, half-life and solubility: Strontium 90 (28 years), Cesium 137 (27 years), Iodine 131 (8 days), and Carbon 14 (5,600 years). Of these, Cesium and Strontium are the most important, and in that order, as surface contaminants and by means of rainfall from the stratosphere. They are deposited mostly in spring and early summer when rainfall is highest. They appear in certain foods: notably milk, and grains, especially rice. All levels found so far have been well within safe limits, but there are marked regional variations in the levels observed. Thailand, with rice as its chief diet component, has shown the highest levels, and Vietnam's figures are three times those of Ecuador and Peru. (One wonders what they may be in China.)

Research problems and unanswered questions crop up in every survey. These may be as simple as supplying a non-existent table of food analyses for Bolivia or a new height-weight table for Peru. But why are the Peruvians con-

sistently more than 10 per cent over our standard weight for height without being obese? It is an enigma that Filipinos, on a decidedly suboptimal vitamin A content in the diet, have a high blood level of A. Why do Spaniards have a low blood cholesterol in spite of a fairly high fat diet? (But their cholesterol levels do correlate with systolic blood pressure.) One is reminded of the reverse condition of familial cholesterolemia reported last year in Bombay at the Congress on Cardiovascular Diseases by Jose of Australia. The problems in many places of goitre and of anemia have been mentioned. What bearing may the avitaminoses in Thailand and Vietnam have on high infant mortality? And the caloric and nitrogen deficits in Chilean children on rheumatic fever incidence and mortality (14 per 100,000) and on tuberculosis? Why is gastrointestinal cancer twice as frequent in Chile as in the United States? Are there carcinogens in some foods? smoked foods, perhaps? A chemist of N.I.H. and consultant in food surveys, Olaf Mickelson, Ph.D., with whom I traveled on survey missions in 1956, has come up with an explanation of the high incidence of amyotrophic lateral sclerosis in Guam (100 times that in the United States): the periodic consumption, during periods of short food supply, of the seeds and trunk of a palm-like tree, *Cycas Circinalis*, for its starch content. In pigs it has a carcinogenic effect, with liver necrosis and hepatoma formation. And one still wonders what the disease was which at the time of the survey in Bolivia, was epidemic and with fatalities in one community: the virological studies are still in progress at INCAP, Guatemala.

Since there were positive findings in every survey, it follows that in each instance there have been *recommendations* for their correction. Here the emphasis has been on practicality and on continued study and observation. Remedial measures must be within the ability of the country to implement. Future nutritional assessment depends on increased capability of local scientist personnel and on adequate laboratory support. Future improved processing and use of food calls for more know-how by many people. Implementation, support and education are the responsibility of government.

Therefore all recommendations have included the establishment by government of *interdepartmental committees* with responsibility for all aspects of nutrition study and control. (It is here that the earliest efforts to set up the survey begin to pay off.) When applicable, similar agencies and offices within departments, such as the military, are recommended. In the military, too, *schools* for cooks, bakers and food handlers and *training courses* for their officer superiors are important parts of the future program. *Better cooking methods* are proposed, as are *planned menus* in the Armed Forces, not only to meet dietary needs, but to reduce the wastage that monotonous diets often produce. *Iodinization of salt* must be government-implemented, since salt is commonly a government monopoly. *Enrichment of foods* to correct specific deficiencies, such as iron or thiamine, must be on a wide scale to be effective, and so must also be administered at high government levels. *Fluoridation of water supply* is in the same category.

The usefulness of nutrition surveys depends wholly on the extent to which their recommendations are carried out. Therefore *follow-ups* in each country surveyed are an important part of the program. They are carried out by senior staff and members of ICNND a year or so after the submission of the report, and at times again in later years when need arises, or occasion offers in connection with other surveys nearby or with international meetings devoted to nutritional problems. (It was while accompanying Dr. Berry and Dr. Schaefer to such a mission in Teheran in 1956 that I had an unexpected and pleasant reminder of this college, when the Minister of Health of Iran, on learning that I was a Philadelphian, asked to be remembered to his friends, Scheffey and Kimbrough. A graduate of Syracuse, with residency training and American Board certification in Obstetrics and Gynecology, Dr. Saleh had returned to

Teheran, and became professor and chairman of that department in the Medical School, and eventually, as he proudly announced, Dean of its faculty. When I did not seem duly impressed by that statement, he added "You must realize that here the dean is elected annually by the faculty, he must receive a two-thirds majority, and I made it for 7 years!")

Through such *follow-up studies*, including a review of local records of continuing survey activities, it has been possible to assess the *results* which have been achieved. The record is highly gratifying.

In each country there now exists in government at high level an *Interdepartmental Committee on Nutrition.*

In each country there is functioning an *Institute for Nutrition*, centered on the first survey laboratory and served by that laboratory's augmented staff. In Ecuador, which had such an institute before the survey, but with meagre support, the Institute now has a very active program that includes education in nutrition in the civilian population, assistance to the Armed Forces in improving their rations, and research projects that have been found worthy of grant support by our National Institutes of Health and other agencies.

The Armed Forces of the several countries surveyed have not only carried out most of the recommendations, but have extended them. A number of Service Schools are training officers and enlisted men in all aspects of military feeding and sanitation. In those countries with universal military training, this diffuses the knowledge gained into the whole population. What is more significant, the countries in which the original nutrition survey was limited to military units have extended their nutrition study programs to all civilians. This has happened in Pakistan, Turkey, Korea, Formosa, the Philippines and Peru.

Turkey has done an outstanding job in all aspects of nutrition. It now has schools for cooks, bakers and sanitarians in the Armed Forces. It has a fine program of nutrition study in its civilian population, and of enrichment of certain nutriments as recommended. It early sent a medical officer, expert in nutrition, to this country for further training in this field, who since then has participated in three of our surveys in other countries.

Pakistan's Armed Forces Nutrition Institute has developed a new field ration for the military. It is now engaged in a 3-year survey of the whole civilian population, and in this program has enlisted the help of FAO, UNICEF and consultants of our ICNND. I was privileged in 1956 to observe the beginnings of this program and the thoroughness and enthusiasm with which it was pursued.

Ecuador had known for years of its goitre problem and the need for iodinization of salt. It took the impetus of our survey in 1959 and the aroused activity of government to revitalize this program so that salt iodization is being actively pursued by support from UNICEF, and, in addition, the fortification of flour with thiamine and riboflavin is being investigated.

Vietnam has established its Laboratory of Nutrition in the Department of Health, where an active program of education and of supplementation of dietary thiamine and riboflavin, begun in the military has been extended to the civilian population to relieve deficiencies that have been critical.

Spain has provided its military with a new and much improved field ration.

Colombia is witnessing an activity of major importance for all of Latin America. Following our survey in 1960, arrangements were made to establish an *International Center for Medical Research and Training* at Cali, financed by the National Institutes of Health, and supervised by Tulane University, to train workers in various fields, including nutrition, for Colombia and all other Latin American countries. In 1961 the Center began a cooperative nutrition program, with participation by the Department of Nutrition of the Medical School at Cali, and by the Harvard School of Public Health, and with support from the Rockefeller and Kellogg Foundations. The staff of the Center includes a full-time professor from Harvard in residence in Cali and other Harvard staff consultants. In the Department

of Preventive Medicine of Cali Medical School, they are expanding research in *experimental nutrition*, using South American primates, while studies in *clinical nutrition* and better *dietetics* are being carried out in the Cali University Hospital. Another activity which the Center is promoting is the fluoridation of water supplies. (It seemed tragic to me to learn only last week in New Zealand, the nation with perhaps the poorest teeth in the world, that Auckland, whose metropolitan population is one-fourth of that of the country, has not yet achieved such fluoridation, because of the opposition of a small but voluble lunatic fringe.)

There are becoming available a number of *objective yard sticks* by which to measure the results produced by our nutrition surveys. I shall mention only two.

In Korea, before the survey, 52 to 55 per cent of all recruits had to be rejected because of malnutrition. Two years later, thanks to trained personnel, better kitchens and bakeries, new canneries, and the general use of whole wheat, which is cheaper and more nutritious than polished rice, the figure was 6 per cent. (The experience in Formosa is comparable.)

In Iran, before the survey, recruits were capable of only 4½ hours a day of active maneuver and work. Now this has increased to 8 hours.

Then there are the evidences of an aroused and growing interest in nutrition furnished by a series of *international meetings* devoted to the subject. Six such Armed Forces International Conferences have been held: Iran (1956), Turkey (1958), Pakistan (1959), United States (1960), Spain, Vitenam (1962). The United Arab Republic organized a Food Conference which was attended by our invited representatives. The Middle East Annual Medical Symposium, held each year since 1959 in Beirut, Lebanon, has devoted a part of its agenda to nutrition.

An increasing number of *students of nutrition* are coming from many lands to this country for additional training.

We are planning to offer *ongoing advice* by assigning experts in food, nutrition and sanitation to Military Aid Groups in Greece, Iran, Pakistan and Turkey, as suggested by ICNND.

Of the greatest importance, even though it cannot be assessed in measurements or figures, is the *good will* which the program has engendered in so many parts of the world. Medicine, health, speak a universal language. International medicine is indeed a potent tool for peace.

What has all this cost the American tax payer? Before I answer the question, I cite one example of the reasonable practicality of our programs. The U. S. Army realized the need for supplemental feeding in the Vietnamese Army and sought to meet it by supplying our field rations, at a cost of over $250,000. It was a dismal failure: the ration was unacceptable to the Vietnamese soldiers who took the chocolate and cigarettes out of the package and threw the rest away. On recommendation of our survey, suitable vitamin wafers, manufactured in Vietnam, are being issued for daily use throughout their army, and the entire cost of one year's supply is $11,500.

The total cost of all the 22 surveys to date is under $1,500,000. I submit that this is the best return for the tax payer's dollar in all the land.

A brief final comment on the results that have accrued to the survey team members themselves. (For all there was rich reward in opportunities for service: occasionally unexpected and urgent, as when the earthquake in Chile made first-aid men out of the surveyors.) We have learned much about many things. We have accumulated much, tangible and intangible: inoculations and immunities, pictures and friendships, souvenirs and experience; experience at times in the hard way, such as learning how to live safely under primitive conditions. Its price for some came high, in illness and worse: (two died of amebic abscess of the liver) and, in addition to Dr. Sandstead, two others lost their lives in plane crashes, both in the Andes.

I treasure countless memories of countries visited: in Turkey, the Blue Mosque in Istan-

bul, the village of Ilyakut on the Anatolian plateau, and in the Bosporus a glimpse of my war-time ship, once the USS Solace, now the SS Ankara; In Iran, the Gulestan Palace with the Peacock Throne, a school in Mamizan for village boys and girls in farming and home economics, a caravan of nomads; in Pakistan, the Army Medical School at Rawalpindi, refugees in Karachi, the Khyber Pass; in Ethiopia, the swimming pool that some far-away architect must have dreamed up for this hotel in Addis Ababa, 9 degrees north latitude, but used only as a lily pond, since at 9000 feet the nights are always cold; in Libya, Suk el Juma (the Friday Market) near Tripoli, and the Sebha Oasis, far in the Sahara Desert, but with petrified trees and a malaria problem; in Uruguay, the Carnaval that enforced a pleasant interlude in the survey; in Ecuador, a dug-out canoe with outboard motor in the little sea port of Esmeraldas, and breath-taking, hair-raising vistas on Andean highways up to 15,000 feet: three of these countries I visited in anticipation of a survey, two in follow-up, and three during the survey itself. Still more do I value the many friends I made along the way, and the insight I have gained into the problems of other lands and peoples. Above all do I treasure my appreciation of the courage, fortitude and high principle with which they are facing those problems under the greatest of difficulties: in short, my faith in my fellowmen, wherein lies the hope of the future.

In bringing this lecture at long last to a close, I think of the words of Coleridge in the opening lines of one of his poems:

"It is an ancient mariner,
And he stoppeth one of three."

The other two got away, because they knew what a long-winded bore an old sailor can be, if once you let him get started!

Indian Summer: Ten Weeks at the All India Institute of Medical Sciences[1]

By LEWIS MERKLIN, JR., M.D.[2]

DELHI is a succession of cities, each the seat of an empire, each reduced by conquest. A capital again, it is marked with ruins, fortresses and tombs, the legacies of the Tartars and Tughluks and Moghuls and Mongols who fought, flourished and fell there. It is the administrative center of modern India and the meeting place for the people of a nation as polyglot as our own. Old Delhi is a tangle of narrow alleys, and a brief walk through its bazaars assaults the senses with every manner of human condition; New Delhi is a planned city of broad avenues, embassies and government housing, far more orderly and far less interesting. With the rapid expansion of government offices and the influx of refugees from the areas of British India partitioned to Pakistan, the population of the Delhi area has tripled in 15 years, throttling the old city and exploding into the open country of the surrounding Punjabi plain. In this area of political, economic and social change, the medical problems are manifold, and it was my great privilege to study them as a Smith, Kline and French Foreign Fellow at the All India Institute of Medical Sciences.

Under the thoughtful sponsorship of Dr. Edward M. Holmes, Jr., Visiting Professor of Preventive and Social Medicine at the Institute, I spent ten weeks in Delhi and the surrounding Punjab, exposed daily to medical and social phenomena often incomprehensible but always fascinating. The Institute is a government-sponsored medical school and hospital with full time clinical and research personnel and approximately 50 students in each class of the $4\frac{1}{2}$ year course. Students enter at 17 after a two-year preparatory course and are graduated with the degree of Bachelor in medicine and surgery. They must serve an internship for one year at the same hospital and are then qualified to practise general medicine. The title of Doctor of Medicine is reserved for those who complete a registrarship, submit a thesis in that field and pass an oral examination. Classes, laboratories and housing are provided on the campus of the institute on the outskirts of the city and the 400-bed hospital is housed temporarily in the nurses' hostel until the hospital unit is completed.

The department of pediatrics, where I spent the first three weeks of my stay, was the first such department in India and even now there are only 400 pediatricians in a nation of 450 million. The out-patient department and wards were always crowded with sari-clad mothers and their strangely quiet children, their brown eyes enormous and ringed with *kohl*, a black paste of ash and water. Nutritionally, the Punjab is better off than most of rural India, but the deficiency and deprivation syndromes are still common. The protuberant abdomen and reddish hair of kwashiorkor were less common in Delhi than in southern India, but several cases did turn up in the clinic. By far the most common in-patient condition was rheumatic heart disease, with multiple valvular lesions in evidence before adolescence. Although the patients could be stabilized in the hospital, they would soon return in exacerbation since the parents often sold or traded away their penicillin.

A clinically interesting but therapeutically frustrating condition is Indian childhood cirrhosis, which occurs in children two to four

[1] William Harvey Perkins Prize Essay V, The College of Physicians of Philadelphia, 1963.

[2] Intern, The Bryn Mawr Hospital, Bryn Mawr, Pennsylvania. This study was done during the summer of 1962 through a medical student foreign fellowship granted by Smith Kline & French Laboratories of Philadelphia. Dr. Merklin was then a fourth year student at Temple University School of Medicine.

FIG. 1. Dr. Merklin, a village mother and her impetigo-afflicted son.

FIG. 2. The author at the village well; buffalo wallow in background.

FIG. 3. 'House call' at a thatched-roof, mud hut; a young patient with rheumatic heart disease.

years of age, most of them admitted in terminal stages with marked jaundice, hepatosplenomegaly and ascites. The etiology is still questionable, but nutritional factors have been discounted since most cases occur in families well above the lower economic groups, where the deficiency disorders are more common. Since some cases have had a familial occurrence, a genetic predisposition has been suggested.

There were several cases of thalassemia major in the wards, and this hemoglobinopathy has turned up with increasing frequency in the Delhi area since partition. It seems that virtually all the new cases have been among families who immigrated to Delhi when their homeland in West Punjab was assigned to Pakistan, and it was to the same area, near the Jelem river, that the armies of Alexander the Great had penetrated, presumably leaving the thalassemic gene behind them.

The farming village of Karoli is 35 miles into the Punjabi plain from Delhi and eons away from the relative sophistication of the capital. Of the thousand odd population, 97% have had trachoma, virtually all have had amebic dysentery, and the entire village is gripped in the physical and mental torpor of rural India. The field clinic run by the Institute at Karoli handles 100 to 300 outpatients every morning with a high incidence of scabies, impetigo, dysentery and other infections. The villagers live in earthenwork huts with thatched roofs and cow dung floors which are resurfaced daily. They cook their meals of rice, *dahl* (lentils) and fat over fires fed by cow dung patties and they sleep on the *charpoy*—a square wooden frame with a bed of interlaced fabric thongs. During the hot summer the whole village sleeps outdoors, retiring after the stupendous sunsets and monsoon cloud formations, awakening to the cry of mating peacocks and an equally astounding sunrise. The verandah of the clinic quarters was the meeting place for the village council and was also the scene one night of active bargaining among the townsmen on their *charpoys*, all of them haggling long and hard over the size of the dowry and the terms of the betrothal of two young villagers.

Since 80% of India's population lives in rural areas similar to Karoli, the villages' medical care is of paramount importance. Drugs and doctors are now in better supply, but the outstanding problem is one of education. Although the government installed a new tube well in Karoli, the villagers think it polluted because the pump is enclosed in a brick shelter. They prefer the village well, open as it is to any contaminant, thinking that exposure to sunlight keeps the water clean. Many of the

villagers go for treatment to the indigenous healers known as *hakim* or *vaids*. These local medicine men rely on talismans, herbs, roots or poultices, often producing severe wound infections. An important part of their therapy lies in unguents and potions of heavy metals, leaving their patients no better off and often leaving them with the effects of lead encephalopathy, mercury poisoning and wrist drop. There was one patient admitted to the Institute with carotid insufficiency who had finally come for treatment when he lost confidence in his *hakim's* regimen of three bowls of wild pigeon broth, t.i.d. The indigenous practitioners are not above adapting to the age of antibiotics, however, and one story had it that the more advanced of the *hakim* were mixing chloramphenicol into their typhoid potions.

Yoga is an essential part of many Indian lives, if only as a measure for physical and mental discipline. The great bulk of amateurs practise Hata Yoga, which emphasizes physical control as the requisite for mental repose. It is the more extreme of this group who indulge in the physical feats of contortion and punishment such as walking on beds of fire or hot coals. Raj Yoga, on the other hand, emphasizes the attainment of *samadhi*, a more exalted spiritual state independent of external consciousness. Dr. B. K. Anand, a physiologist at the Institute, has conducted experiments on three such yogis who have attained *samadhi*. While many yogis claim to voluntarily stop their heartbeat, what they actually do is the Valsalva maneuver, thereby obliterating pulse and heartbeat, but exhibiting a normal EKG tracing. Dr. Anand studied each yogi in a sealed box, equipped him with EEG and EKG sensors and took serial air samplings. During *samadhi* the yogi developed a state of "super-consciousness" which by EEG pattern resembled the waking state, but the subject did not respond to light or auditory stimulation. The EKG showed complete heart block, the BMR decreased 50%, and while the pO_2 decreased to 15% and the pCO_2 increased to $5\frac{1}{2}$%, there was no reflex hyperpnea or tachycardia. It is thought that through the use of "internal rhythms" the yogi can produce a block of sensory afferents despite EEG signs of consciousness and through modification of the limbic system regulate effective behavior and autonomic function.

A common diagnosis on the medical service, where I spent three weeks, was tuberculosis but since my experience in the United States had been limited to chest lesions, I was struck by the protean aspects of the disease. It was a frequent cause of abdominal complaints in its ileocecal, peritoneal and lymphatic forms, the usual agent for constrictive pericarditis and the second most common cause of amenorrhea. Although Delhi boasts a well-staffed TB hospital in nearby Mehrauli, the overall Indian ratio is one bed to every thousand patients. Home care is the only possible answer, but many families don't want to be burdened with the social stigma and physical inconvenience and the elementary precautionary measures are often difficult to teach. The extent of TB infection is difficult to determine, but one study of accidental deaths in Delhi revealed that 25% of the victims had tuberculous pathology on autopsy.

Hookworm infestation is widespread, and it is not uncommon for patients to come to the medical clinic complaining of "weakness", their conjunctivae as white as the linen *dhoti* around their waist, a hemoglobin of 1.5 Grams, and their nails so extensively spooned that a drop of water could easily be placed in the hollows.

The neurology clinic was particularly rich in experience heightened by the teaching of its young director, Dr. R. N. Gaind. Post-meningitic and post-encephalitic sequelae were the most common cases, but the clinic was a regular way-station for the pathetic pilgrimages of the lame, the halt and the blind seeking relief for a host of pitifully irremediable neurologic disorders. One case of spastic paraplegia with radicular pain was subsequently diagnosed as lathyrism, thought to be a toxic or allergic reaction to the Bengali chick pea. A troublesome convulsive disorder on further examination turned out to be cerebral cysticercosis, confirmed by X-ray and muscle biopsy. Not all of the patients suffered from organic disease. There is a high degree of conversion reaction and Indians are prone to somatize their

emotional problems. I saw three cases of probable autistic psychosis, but adequate psychotherapy is unavailable.

Obstetrics is in the hands of the local *dai*, or midwife, and only the complicated cases are hospitalized. Virtually all obstetricians are female; even male visitors provoke a flurry of concern. The beds are always full at Lady Hardinge Maternity Hospital, the average post-partum stay is two days, the infant mortality rate about 10%. There were two cases of clinical eclampsia on the day I visited the hospital and my guide explained that there were three to four such cases a month. Vigorous efforts are being made in the promotion of family planning through city and village clinics and lectures; it is even advertised on the backs of the Delhi buses. However, the best results are in the small middle class, the very segment of population that the government is encouraging to expand.

Working at first hand with the students and faculty, joining them in their homes and dormitories, I answered as many questions about America as I asked about India, and it was not difficult to reach a common ground of understanding and community of thought with the people of a nation eager to be western and simultaneously proud of their own culture. The ideas of old India die hard, but in 15 years of independence, much has been accomplished in the awakening of the subcontinent. The caste system has been officially de-emphasized, but 5000 years of social structure cannot be legislated out of existence. The family is still the core of an Indian's personal life: filial duty and parental domination are still the rule, to the point where many men are emotionally hamstrung by the extent of paternal control. Palmistry and astrology are taken in dead earnest and betrothals among even the most educated still hinge on the favorable relationships of the couple's zodiac. On a Sunday trip to Chandigarh, the new capital of the state of Punjab, I was amazed to hear two of the most "Western" registrars discussing the relative merits of the better-known Delhi astrologers and whom they would patronize before making an important decision.

While in Delhi I had the good fortune to live in the home of Mrs. C. S. Deva, a gracious and hospitable matriarch, who made the adjustment to the climate and civilization an easy one. The 115° heat and dust followed by the drenching rains and humidity of the monsoon season were easily offset by the lush, cool evenings; the sacred cows and water buffalo in the streets soon became commonplace, but the elephants, camels and scooter rickshaws were always exciting. Although the Deva children were grown and raising families of their own, they all came for dinner frequently or we went to their homes, and by this exposure I was able to see India in microcosm and to interpret many of the paradoxes of the country in relation to the people with whom I was living. I soon learned to eat six meals, of varying quantity, per day and to stay out of the midday sun. It took only a little longer to get used to eating with my hands and the folded round piece of dough known as the *chapati*. Each family dinner had a new variety of curry or rice or the dish that was to be my favorite—lotus root with chopped lamb. There were mangoes every morning and an inexhausitible supply of tea and sticky sweets accompanied by tales of life under the British, the horrors of partition, houseboating in Kashmir and the epochal changes in Indian life in the brief span of Mrs. Deva's 64 years.

The value of the Fellowship experience cannot be adequately assessed in a brief account of activities or interesting cases, nor can it be a pleasant memory of peacocks and the rainstorms and the Taj Mahal. It is above all a realization of the individual's responsibility to acquit himself well in an alien society. The Fellow is no longer an American medical student; as far as his associates are concerned, he is *the* American medical student. He has lost the white-jacketed anonymity of medical school and has become a spokesman for his culture and a student of theirs. It is this dual function which is the real value of the Fellowship in that it fosters development of the student on both a personal and professional level. I am grateful for the experience and the realization of it.

Michel Sarrazin (1659–1734): The Father of French Canadian Science[1]

By RODERICK L. TONDREAU, M.D.[2]

FEW peoples have had a more colorful history than the French Canadians. Tales of exploits during the days of the Old Régime in Canada have been lovingly embroidered by many historians. Even the staid, great New England Puritan Francis Parkman waxed romantic until the narrative attained a legendary hue. And yet, a mere relation of the events is so dramatic as to require no embellishment.

From the founding of Quebec by Champlain in 1608 to the defeat of Montcalm by Wolfe in 1759, a succession of dashing and interesting characters appeared on the North American stage. There were explorers, notably LaSalle, Marquette and Joliet. There were warriors and coureurs de bois. There were Intendants and Governors including the great Count Frontenac whose masterful handling of the Indians was never equalled by other white men. There were the Jesuit martyrs especially Fathers Brébeuf and Jogues. There were dedicated nuns who established schools and hospitals and there was the architect of the church in New France, its first bishop, François de Montmorency-Laval, an ascetic noble who has been hailed as both saint and tyrant. Finally, one should mention the man who sat on the throne of France for seventy two years between 1643 and 1715—the sun king—Louis XIV who, if he did *not* say "*I* am the State", *was* in fact!

The following is an account of one of the less well known actors in this fascinating play:

When a French Naval Squadron left Rochelle for Quebec in June, 1685, it carried a new governor, Marquis de Denonville, a new bishop, Monseigneur de Saint-Valier, five hundred soldiers of whom a hundred and fifty died of fever and scurvy on the way (1) and an unknown young surgeon destined to become the Father of Science in French Canada.

Michel Sarrazin was born September 5, 1659 in Nuits-sous-Beaune, a little town in a section of Burgundy even then famed for its wines. Between the time of his inauspicious landing on August 1, 1685 and death in 1734, Sarrazin would achieve recognition as a scientific investigator and public figure and would distinguish himself as the leading physician-surgeon of the colony numbering among his patients, governors, intendants and bishops.

A year after his arrival, Sarrazin was named Surgeon Major by the Sovereign Council, an order confirmed by Frontenac on his return as governor in 1689 and by decree of Louis XIV in 1691 (2). In this capacity, he practiced his art not only among officers and men of the military establishment but served the hospitals of Quebec and Montreal and the civilian population of the entire colony without remuneration.

Apparently dissatisfied with training only in seventeenth century surgery and perhaps influenced by his friend, Franquelin, cartographer, professor of science and the leading scientific mind in New France, Sarrazin returned to France in 1694 to study medicine at the schools of Paris and Rheims. Completing the seven year course in three years, he returned to Canada armed with the best scientific and clinical training then available (3).

During his sojourn in the old world, Sarrazin developed a friendship with Tournefort of the Jardin Royale, the great forerunner of

[1] Read before the Section on Medical History, The College of Physicians of Philadelphia, 8 January 1963.

[2] Director, Department of Radiology, Holy Redeemer Hospital, Meadowbrook, Pennsylvania; Associate Professor of Radiology, University of Pennsylvania Graduate School of Medicine.

FIG. 1. Michel Sarrazin (presumed likeness). Courtesy of Quebec Provincial Archives.

Linnaeus. It was at this time that he developed a passion for science. In the seven years following his second passage to Canada, he enlisted the help of officers and trappers at distant outposts in the collection of North American flora which he then carefully studied and described. By 1704, some two hundred such specimens had been sent to the Jardin Royale (later to become the French Museum of Natural History). These plants still thrived after ten years and many years later were catalogued by Antoine de Jussieu (2).

Sarrazin was nominated to the Académie Royale des Sciences by Tournefort and accepted as a Corresponding Member in 1699. One of his communications dealt with the ginseng root, the discovery of which by the Jesuits had involved New France in trade with China where it was prized as a drug. Other reports were concerned with the blueberry and sugar maple later to become important items in Canadian agricultural economy. To commemorate his diligent work, Tournefort named the pitcher plant (Sarracenia purpurea) in honor of the friend and fellow scientist who had collected and described it (2, 4).

Investigations were extended to the beaver, muskrat, seacow, seawolf and porcupine. Sarrazin even attempted to dissect a skunk but could not finish because of the offensive odor. The report on the beaver (published in Mémoire et l'histoire de l'Académie Royale des Sciences for the year 1704) along with his work on the muskrat are thought to represent his major endeavors. His anatomical descriptions are masterpieces of precision. He was a unique figure in the colonial environment. Very few individuals were interested in biological subjects even in the learned circles of Europe. Of the fifty odd subjects treated in the volume of the Mémoires in which Sarrazin's paper on the beaver appeared, only five or six involved biological topics. All others dealt with the physical sciences, astronomy and mathematics.

Although Sarrazin was the acknowledged leader of his profession in the New France of the Old Régime, he did not write on medical and surgical subjects. Knowledge of his medical activities is gained largely through the Archives of the Hôtel-Dieu de Quebec (founded in 1639 the oldest hospital in America north of Mexico). There are records of his devoted care in everyday practice, in war and in the course of frightful epidemics which swept the colony in the early part of the eighteenth century. A violent siege of the grippe carried away many people in the winter of 1700 including two surgeons, Beaudoin and Roussel. During the winter of 1702 03, two thousand perished in an epidemic of smallpox. Few families escaped in a colony numbering fifteen thousand souls. It was said that many died of fright. In 1709, there was an epidemic of yellow fever.

Sarrazin gained surgical experience at the siege of Quebec in 1690. Vallée notes that Sarazin's medical inventory is very similar to the armamentarium of the surgeon, George Jackson who accompanied Sir William Phipps on the expedition from Boston.

FIG. 2. Quebec circa 1763. Arrow points to Hôtel Dieu.

The Annals of the Hôtel-Dieu describe an historic event as follows (translated from the French) (5): "During the early spring of 1700, the dear Sister Marie Barbier de l'Assomption, Congréganiste, had come from Montreal to obtain cure from a cancer of the breast. She had previously lived in our community for four months in 1698 when she had undergone treatment for the same ailment. Because of continued growth of the lesion, she had been obliged to return. After pre-operative preparations, Monsieur Sarrazin, as capable a surgeon as he was a learned physician, operated on her on May 29, 1700; it was the only remedy which could keep her from dying." Thus was recorded the first mastectomy in Canada. Before the operation, the surgeon, patient and entire religious community attended Mass and received Holy Communion. Narcotics were prohibited in France at this time and it seems likely that the patient was given an alcoholic beverage. At any rate she must have stayed conscious throughout as it was noted that she continued to pray until the procedure was completed. Marie de l'Assomption returned to her own religious community resuming all of her duties the following year. She continued her charitable and teaching assignments for nineteen years until death at the age of seventy-seven.

Sarrazin was renowned for his treatment of pleurisy which consisted of alternating sudorifics and bleeding. Records tell of his participation in the medical evaluation of miracles and of his role as a medico-legal expert.

Sarrazin received recognition as one of the notables of Canada. In 1707, he was named to the Superior Council (successor to the Sovereign Council), a governing body composed of Governor, Intendant, Clergy and leading citizens. As a member of the Council, it is recorded that he was distressed by the failure of French wheat to survive the harsh winters. This led him to import a Swedish variety which thrived in the frigid climate. Sarrazin took

great interest in the affairs of the Council and actively participated in its deliberations. He did not hesitate to take positions on issues as witnessed by events that took place on the death of Bishop Saint-Valier in 1727. The civil and religious powers were divided on the question of episcopal succession. The Governor and clergy ranged themselves in one camp while the Intendant and other members of the Council took an opposing view. Sarrazin who was in sympathy with the Governor and clergy absented himself from sessions because of his convictions. The disagreement was resolved only after the Intendant Dupuis had been recalled and the Governor reprimanded. Sarrazin was criticized for having boycotted the meetings but absolved when able to persuade fellow Councillors of his good intentions. (He was later appointed Keeper of the Seals). The affair cost him the friendship of Dupuis with whom he had collaborated in scientific research (2).

Sarrazin's financial status was of interest as noted by Parkman (4): ". . . His position in the colony was singular and characteristic. He got little or no pay from his patients; and, though at one time the only genuine physician in Canada (Callières et Beauharnois au Ministre, 3 Nov. 1702), he was dependent on the king for support. In 1699, we find him thanking His Majesty for 300 francs a year, and asking at the same time for more, as he has nothing else to live on (Callières et Champigny au Ministre, 20 Oct., 1699). Two years later the governor writes that, as he serves almost everybody without fees, he ought to have another 300 francs (Ibid., 5 Oct., 1701). The additional 300 francs was given him; but, finding it insufficient, he wanted to leave the colony. "He is too useful", writes the governor again; "we cannot let him go." His yearly pittance of 600 francs French money, was at one time re-enforced by his salary as member of the Superior Council. In later years, he acquired considerable property and at the age of fifty-three, having finally given up the thought of becoming a priest, married twenty year old Marie-Anne Hazeur, the daughter of one of Canada's leading citizens. There were seven children, three of whom died in infancy. The oldest, Joseph Michel, following in his father's footsteps, went to Paris to study medicine but died there of smallpox at the age of twenty-five. The second son, Claude Michel, moved to Europe where he became a soldier. One daughter, Marie-Jeanne died at nineteen while the younger daughter, Charlotte-Louise-Angelique married Jean Hippolyte Gauthier de Varennes, member of a distinguished Canadian family, one of whom Pierre Gauthier de Varennes de la Vérendrye discovered the Rocky Mountains. Jean Gauthier distinguished himself on the plains of Abraham but was later lost at sea.

At the age of seventy-five, on September 6 1734, Michel Sarrazin entered the Hôtel-Dieu as a patient and two days later died of a malignant fever brought by one of the ships landing at Quebec. Sarrazin's performance as the leading medical and scientific figure of New France was approached only by François Gaulthier who arrived as royal physician in 1742. After the English conquest in 1760, the scientific tradition in French Canada was forgotten for over a century and did not become important until recent years.

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Extinct Medical Schools of Nineteenth Century Philadelphia: (V) The Eclectic Medical College of Pennsylvania and American University of Philadelphia

By HAROLD J. ABRAHAMS, PH.D.

ALONG our sojourn among Philadelphia's schools of medicine of one century ago we now encounter two more Eclectic schools, both bearing confusingly similar names, viz: The Eclectic Medical College of Pennsylvania and The Eclectic Medical College of Philadelphia.

(The data for the articles on the two schools are drawn from the publications of the two colleges, and cannot, with any degree of certainty, be viewed as being entirely above partisanship. For that reason a third article, the data for which will be based upon examination of the newspapers of the period, will follow these studies of the two schools, and, it is hoped, thus result in a balanced view of the two institutions.)

The Eclectic Medical College of Pennsylvania was incorporated by Act of the Legislature of Pennsylvania, on February 25, 1850. The College published a circular in advance of its first session, (Fall-Winter, 1851–52), stating its philosophy of medical reform and giving the derivation of the term Eclectic as coming from the Greek "eklektikos," because of the fact that this medical system claimed to "select from all other systems that which we deem good and useful, and discard that which is deleterious." All systems of medicine had redeeming traits, as well as defects, the Eclectics conceded, but of all systems the one perhaps with the least to recommend it was Allopathy, the system which derived its name from Greek "allos" (other) and "pathos" (disease), founded upon the principle of differences—i.e., the removal of one morbid state by inducing a different one. Yet "even from this something useful may be extracted," the circular grudgingly admitted. Eclecticism stood ready to adopt all that is truly valuable in Homoeopathy, without being entirely committed to that system, and the same for the theories of Electropathy, Hydropathy, Neuropathy, Thomsonism, Botanic and Chrono-Thermalism. Eclectics were not "exclusivists." They had thrown off the ancient mental fetters, and were "prepared to erect a monument upon the broad base of nature and her immutable laws, which shall be as durable as the Pyramids of Egypt!" Eclectic physicians could now "boast of many stars of the first magnitude in the galaxy of medical science," and further proof of the dawn of a new day of acceptance of their system was the fact that the bill granting their college charter had passed both houses of the General Assembly of Pennsylvania, "without any opposition." Thousands of citizens, too, gave evidence of the "superlative excellence" of this system of medicine, by their having been saved from impending death from Asiatic cholera, the success in the treatment of which, by Eclectic physicians, "eclipsed that of all other systems." Small wonder! A system which embodies only the truths of all the systems of medicine and of Nature itself must blend in harmonious unison, and result in a structure of broad immutable principles, above any one limited "pathy" or "ism." Eclecticism drew its remedial resources from all of Nature's domains—water, air, light, heat, electricity, magnetism etc. Reason condemned the use of

blood-letting and mineral poisons, for the use of any so-called remedy which does not assimilate with the fluids and solids of the human system was a perverse error, making the young old, the old miserable, and life subject to a thousand ills. If the (mineral) poisons were enemies to health, how could they be friends to disease, a state in which health is already reduced, and susceptibility to disease therefore increased? The proselytes of calomel and other mercurials have made more human barometers than all the artizans since Torricelli! "Yet this is called the art of physic. . . . We blame not those who do the best they know, but we blame those who should know how to do better." Yet the college expressed its hope for the preservation of internal harmony among all medical systems, friendly intercourse with the profession at large, and all current schools of medicine.

The announcement for the fourth session (1854–55) continued to belabor other systems of medicine, stating that the adoption of the use of aconite and lobelia ("the latter once proscribed by orthodox medical men as a deadly poison"), did not entitle a physician to be considered an Eclectic, especially if he continued to give his patients the hated calomel in combination with mandrake for "removal of bilious fevers and hepatic congestions." In giving calomel in combination with mandrake a physician reveals his lack of faith in this mercurial, and an ignorance of the power of mandrake alone, leaving him neither the right to be called Eclectic or orthodox. The true, ("reformed"), Eclectic discards blood-letting, blistering, mercury and other useless and hurtful things in favor of "innocent" agents which make no severe drafts on the constitution of a patient. He remains free to act, having broken with the exclusivist philosophy, and can therefore adopt any agent or method which the liberated minds of Eclectics have enabled them to discover.

In 1857 a reduction in rates for "professors' tickets" was announced and an effort made to attract impecunious students, as well as students of law, theology, liberal arts, etc.; and even physicians practicing other systems. A restatement of their principles in that year added antimony, arsenic, copper and lead to the proscribed mercury and other dangerous mineral poisons which "tended to corrode or adhere to the more delicate tissue of the body . . . . thus giving rise, after their first effects, to secondary ones often dangerous and fatal to health and life," more especially since "safer, yet equally efficient medicines, derived from the indigenous plants of our own country" were known. Mercurials and their ilk should therefore be gradually laid aside and other agents discovered and adopted. General blood-letting as a remedial agent, should be abandoned. Lastly, Eclectics of this college believed and taught "that inflammation is not an exalted condition of vital action but a depressed one, that it is a condition in which the capillaries are morbidly relaxed and over-distended, and in which the blood that is passing through them is first abnormally excited and chemically changed and then stagnates and coagulates." This led Eclectics to prescribe agents which "tend to equalize circulation, excite secretion and excretion, restore the functions of the skin and cause elimination of effete matter from the blood through the kidneys and bowels, faster and with greater safety" than could unaided Nature.

Demand for "thoroughly educated Eclectic physicians," it was claimed by the College, was increasing, especially in the West and South.

The Valedictory Address by Henry Hollembaek on February 22, 1854, reviews numerous items of interest in the history of medicine. He quotes Lord Bacon: ". . . . in the opinion of the ignorant multitude, witches and impostors have always held a competition with physicians," and the renowned Galen: ". . . . patients were more obedient to the oracles in the temple of Esculapius or to their dreams, than they were to his prescriptions." In Germany it was believed that bleeding should be done in the Fall and Spring. Even in our own time, mourned the professor, some of our citizens "paid their devotions, with the last penny, to

astrologers and soothsayers for the removal of disease." He cites the custom of laying the sick and helpless on the roadside, that travellers might offer new remedies for their relief—"and this mode of practice is explained to us by the familiar story of the Good Samaritan."

The most celebrated of the ancient physicians seldom bled their patients, nor gave mineral agents internally. The decline of the Roman empire was attended by the arrest of progress in medicine, and the arts and sciences perished nearly completely after Rome fell. The universe of the mind passed into dreary desolation. Only a few simples remained to the people, the dressings of wounds was left to the ladies, and the cure of fractures, luxations, and broken bones to the knights. Nothing was heard or seen, but the alarm of war, and there was no time to die of disease! A new era in medicine began to dawn in the thirteenth and fourteenth centuries, when the medical work of the ancient physicians began to reappear, and practical knowledge, rather than theory, lead to the use of drugs chiefly drawn from the plant kingdom, and few of them were fatal or dangerous. Then came the era of "light" from chemistry, in the fifteenth century. Paracelsus introduced mercury or "queck-silber," and thus caused the stigma of "quack" to be hurled about, and himself to end as "the Prince of Quacks." The tried and true remedies, drawn from the herbs and flowers of the field, (which had done so much good for mankind from the days when Hippocrates entered Athens, amid scenes of despair, panic, riot, tumult, ruin and madness, and "shook off with a giant's strength the deadly grasp" of the spreading plague), were respected until the end of the sixteenth century. Yet the seventeenth century, despite the ill repute of the "quacks" of the two previous centuries, saw the ascendency of chemical and mineral drugs, which became the new destroyer, as destructive as the desolations of war. Herein lies the objection to Allopathy—the compounds of antimony, arsenic, copper, lead and zinc may produce inflammation and pain, and may produce and prolong diseases—even violent and sudden death. Paracelsus' mercury is even worse. His followers have made "improvements" in the catalogue of mercurials—witness the acetate, bi-chloride, bi-cyanide, bin-oxide, bin-iodide, bi-sulphuret, black oxide, black sulphuret, bromides (mono-, and di-), cyanuret, iodide, (mono-, and di-), calomel, persulphate, prussiate, red iodide, red oxide, red sulphuret, yellow sulphuret and ammoniated mercury! These are destroyers of the human race. They are fit only for use on the artist's palette, as pigments for painting. Of the numbers who now sleep in death, or groan in every change of the atmosphere, no tongue can tell.

The use of the lancet also wins its share of condemnation from Professor Hollembaek, who finds the blood-letting of armies, arrayed against each other on the field of Mars, less sanguinary than the Allopaths with their lancets!

But there is hope for us. The mercurial-bleeding practice is European in origin. Let us rejoice that our American forefathers have given us a rich heritage—the right to think for ourselves. By this right Americans "began to question the propriety of dying, even in a scientific mode." Dr. Samuel Thomson, about 1815, gave us his system of medicine, and was promptly imprisoned, thanks to jealousy and fear on the part of old practice. Dr. Burke, of Baltimore was tried for manslaughter, jeopardized in open court by the testimony of Allopaths, under oath, that ten grains of lobelia could produce death. Therefore friends of the new system, before court and jury, swallowed without harm to themselves, doses of more than thirty grains of lobelia, thus foiling the prosecution. Shortly thereafter, as a result of the trial, the Legislature of Maryland legalized the new practice. The Legislatures of Ohio, Tennessee, Kentucky, New York, Massachusetts and Pennsylvania soon followed suit. At this juncture numerous other new systems arrived on the scene, to capitalize upon the new mood of the times which the victory of Eclecticism had won—Homoeopathy, with its theory that the smaller the quantity the greater the power

and its dietetic rules which diverted the mind, "allowing Nature to regain its lost forces"; Hydropathy, which reasoned that, because in some cases, the fury of a maniac could be subdued by cold water, this power of water could be used to cure other diseases; the Chrono-Thermal system which holds that as the moon passes through periodic changes, so may diseases be periodic; Electropathy, which holds that the current of an electric battery applied to the nervous system will cure all diseases; lastly the spiritual doctors or "Rochester Rappers," a discussion of which would take us back to the subject of ancient witch-craft.

Useful in some respects as all of these systems may be, they claim credit exclusively for themselves. Hence the necessity for Reformed Eclectic Medical Colleges, which prescribe no limited bounds but accept good, from whatever source, and similarly reject what is bad. There are no special dogmas, and reliance is placed only in reason by this American movement of progress in medical science, by means both of reform, and of investigation, for the discovery of new truths.

In a speech at the close of 1855, Professor Marshall Calkins made a very vigorous plea for the strictly scientific attitude in the formulation of medical theory. (One could not quarrel with his utterances on this occasion). He then proceeded with an assessment of strengths and weaknesses of each school. Allopathy had made gigantic contributions to medical knowledge. Its greatest hindrance were its conservatism—its tendency to "persecute" the discoveries not made by its own physicians, and its reverence for authority, its use of dangerous agents, its refusal to investigate the properties of plants indigenous to American soil as hopeful substitutes for mercury, arsenic and antimony, and lastly its conservative medical ethics, its readiness to disfellow all physicians who do not worship the accepted medical credo. Homoeopathy has things to commend it—close observation of symptoms, strict adherence to dietetic rules, the power of Nature in curing disease, without the use of harsh medication—all of these Eclecticism could accept and incorporate into its system, but the dreamy imagination of the infinitesimal dosing, and the assumption that "similia similibus curantur" is universal, (and hence all other principles of cure false) are unscientific and unreasonable. Hydropathy relies upon diaphoresis to expel disease through the skin, a physiological principle too much neglected. The weakness of this system of treatment is that it discards all medication. Chrono-Thermalism is not without valuable truths, but its assumption that it is of universal applicability is faulty. Similarly Thomsonism, Botanicism, the Indian mode of practice, all have made contributions, but all stand in need of study to ascertain the real value of their remedies. The Eclectic makes the acquisitions of all systems his own, but not without guiding principles. He does not take a little here and a little there, a little pepper and a little mercury, a little belladonna and a little lobelia, now a little bleeding, a little leeching, now a slight touch of the electric finger of Jove. Guided by principles of physiology and pathology he selects from among the best remedies of all systems the particular one which will remove the cause of a disease without injury to the tissues of the body (i.e. "without depressing the vital forces"),—for example, to treat idiopathic fever, he selects from the various diaphoretics of all sects, that one which will best restore the capillary function of the skin, whether it be water, applied hydropathically, aconite, veratrum or lobelia, and applies it fearlessly. Then he directs attention to the other excretory organs, using the same principles of selection and application. Other systems select drugs from their own limited fields of observation, basing their principles on the authority of great names, or on precedent, or ancient theories, not on those of physiology and pathology. A great contribution has been made by Eclectics in the introduction into materia medica of many new drugs obtained from plants indigenous to America (about sixty in number) and contributions have also been made by them to pathology. Eclectics

also reject objectionable agents, as well as accepting tried and true ones. The strength of the American way lies in its freedom from despotism, its tendency to original investigation and discovery. The difference between the ancient and modern worlds is that the former permitted only those in high position to pursue science, thus limiting the number of investigators, while today, in free countries, science is open to all. Thus the most important difference between the two eras is not so much in the degree to which research is carried on but in the number who can participate. Medicine can profit from this wide distribution of its potential contributors. So far as the sciences fundamental to medicine are concerned (anatomy, physiology, chemistry and pathology) they are useful only as they enable the physician to know how and when to use curative agents. European doctors excel in their knowledge of science, but in general are most ignorant of the remedies which can cure disease.

> "To a great sum their knowledge does amount,
> But all they know turns to an ill account."

The American reformers (Thomsonian, Botanic, Herbalist, etc.) seek and find better and safer remedies than are known to the Allopath, but they are ignorant of the sciences which teach the manner of applying medicine, and they therefore also fail of success, (as do the learned physicians), but from a different cause. The Eclectic succeeds because, like the Allopath, he has a knowledge of the basic sciences, and, like the Thomsonian, a wide knowledge of available remedial agents, and he remains an experimenter, and searcher after truth. The ethics of Eclecticism permit consultation with doctors of other systems, in search of what is best. And the strongest recommendation of this system is that it is everywhere meeting success and acclaim. While Dr. Thomas Watson of King's College, London, frankly expressed doubt that "the aggregate number of deaths in cholera is at all disturbed" by his craft, and the Allopaths in Cincinnati could not reduce mortality below the thirty to fifty percent range, Dr. Jordan, an Eclectic physician, brought mortality down to less than ten percent, (and elsewhere in the West Eclectic doctors have brought it down to as low as four percent). The losses, for all diseases, are two to three percent for Eclectics, as against ten percent for Allopaths. In epidemics in Western cities and villages Allopaths have lost nearly as many as would have died "were no medication adopted," while Eclectics have saved a large majority. This system has succeeded in alleviating consumption, has cleared up scarlatina, puerpural fever, croup, pneumonitis, pleuritis, dysentery and certain cancers, if not so general or constitutional as to implicate the more important vessels or viscera. Where Eclecticism has come into contact with Allopathy, the result has been favorable to the former. In Cincinnati the two Eclectic colleges have two to three hundred students, the Allopathic college only fifteen to twenty. Dr. Calkins closed his long speech with a restatement of Eclectic principles, dealing with the right of a physician to exercise his own judgment, and his duty to avoid every measure which is known to be dangerous to the constitution. He also stressed the fact that new remedies had been introduced by American practitioners, sufficient to accomplish the effects claimed for dangerous remedies, but without risk, and that new truths should be received and honestly investigated, while errors in the sciences basic to medicine should be promptly corrected. We owe to our American heritage of equality and freedom a respect for the free exercise of American talent and genius, said the Professor.

Dr. Paine, in an introductory speech on October 14, 1856, rejoiced that in the years from 1825 to date the reform movement had spread from Maine to Oregon, had sustained medical journals, had originated medical schools in the West and in the East and had now established in Philadelphia, a college exceeding "in the number of its matriculants one half of the medical colleges in Philadelphia." In recognition of the truth of "similia similibus curantur" Eclectics will give

podophyllin for dysentery and leptandrin for diarrhoea, but when the Homoeopath tells us that one millionth of a grain of silica will produce a powerful remedial impression on the human body and continue to act upon it for a period of thirty to fifty days and that the dose must not be repeated again, else its curative virtue will be destroyed, we are surprised.

[Likewise Hahnemann] . . . . . tells us that a decillionth of a grain of oyster-shell will require forty or more days to effect all the good it is capable of. . . . Let us see how large a dose a billionth is. A billion of moments have not elapsed since the Mosaic creation of the world—and to produce a decillion, that number must be multiplied by a million seven times." (Equally objectionable is the demand of Allopathy that there must be submission to her ipse dixit in medicine).

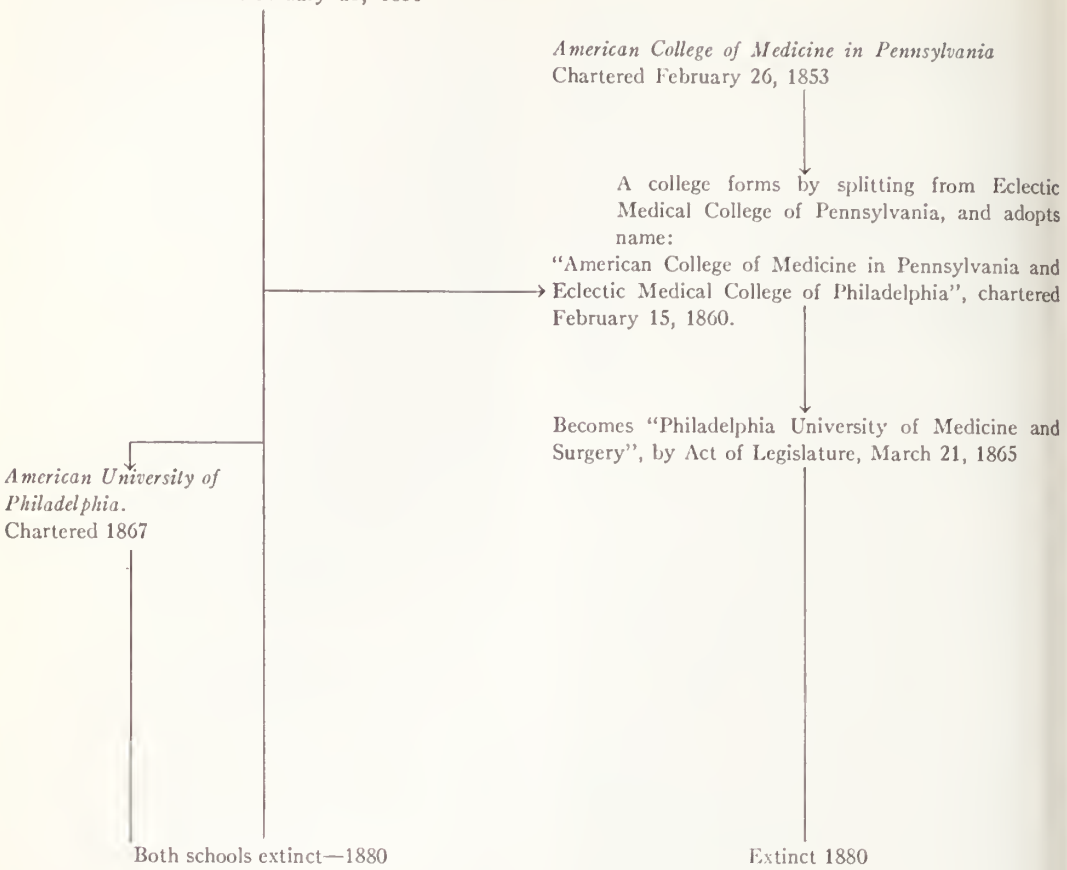
In a quick glimpse at the history of medicine Professor Paine sees little progress from the times of Hippocrates to those of Rush. Chrysippus and Erasistratus condemned bleeding and drastic purgatives, but could offer nothing better, nor did they contribute anything to the meager materia medica. Pliny says that "Rome was six hundred years without a single physician." Galen wrote commentaries on Hippocrates, but contributed in no visible degree to a more rational system of practice. Avicenna, at the opening of the twelfth century wrote his "Canon Medicina," a kind of encyclopedia of all that was known of medicine at the time. It, too, contained little that was new, repeating all the superstitutions of magic and necromancy, purgation and bleeding of Hippocrates and Galen. The materia medica became enlarged in the late middle ages and early modern times, when the science of chemistry contributed both remedial agents and laws to explain principles of health and disease. Paracelsus, regarded by many as the father of Allopathy, boasted that he had discovered the Elixir Vitae, a preparation of mercury, and those who followed him added the compounds of other poisonous metals to the materia medica. Despite advances in anatomy, physiology and pathology (by Sylvius, Willis, Sydenham, Haller, Brown, Rush, etc.) the materia remained the same as that of Hippocrates and Galen, with the metallic compounds added, and these remedies are little modified today. Despite the extensive researches of modern pathologists into the true nature and cause of disease, the same agents are used for all—calomel, or some other mercurial for troubled livers, idiopathic fever, before dosing with quinine, before bleeding, to cure phthisis, to remove constipation or to stop diarrhoea—calomel, the panacea of the Allopath. (Then he quotes Dr. Chapman at length, on what he has seen in the South of the effects of calomel, and adds the comments of other physicians).

Dr. Paine goes on to urge his students to master anatomy, physiology, pathology, chemistry, surgery, materia medica, and theory and practice of medicine, but also to make themselves familiar with the materia medica of the Eclectics, who were doing such splendid things through their analysis of about four hundred indigenous plants. Seventy newly-discovered remedies from these had overcome the mortality caused by certain fevers and had reduced fatality resulting from other diseases. (A little space will be devoted to the new drugs in the next article). He gives a wealth of statistics to show the vast differences between mortality in certain diseases when treated by Allopaths and by Eclectics—cholera, for example, in a public hospital in Cincinnati, (about 1849), was fatal to only four percent under Eclectic treatment, but to fifty-six percent under that of the Allopaths; of 472 cases of cancer of every variety and location, Eclectics had cured 429, while 11 cases improved, and only 36 died, but Allopathic treatment shows a mortality of 90 percent in this disease. All of this progress has accrued both from the new drugs and the fact that the Eclectic doctors have disproved existing fallacious theories, and greatly modified the applications of old remedies.

We must now leave the Eclectic professors and devote a little space to the upheaval which took place in life of this school shortly before the outbreak of the Civil War.

William Paine (quoted above) had joined

Table of genealogy of the related Eclectic schools of Philadelphia


Eclectic Medical College of Pennsylvania.
Chartered February 25, 1850
American College of Medicine in Pennsylvania
Chartered February 26, 1853
A college forms by splitting from Eclectic Medical College of Pennsylvania, and adopts name:
"American College of Medicine in Pennsylvania and Eclectic Medical College of Philadelphia", chartered February 15, 1860.
Becomes "Philadelphia University of Medicine and Surgery", by Act of Legislature, March 21, 1865
American University of Philadelphia.
Chartered 1867
Both schools extinct—1880
Extinct 1880

the Faculty in 1855 as demonstrator of anatomy, and was soon professor of theory and practice of medicine and pathology, with a leading rôle in the management of the school, by virtue of his persuasive personality, drive, talents as physician and teacher, and executive ability. At that time the college was graduating a very large number of physicians, many of whom were destined for later prominence, as practitioners and authors. Educational standards were high and Philadelphia seemed fated to become the center of Eclectic medical education, paralleling its similar standing in Allopathy. By 1859 Dr. Paine had become Dean. As a result of a quarrel among the members of the Faculty Dr. Paine joined Dr. McClintock (who had resigned from Blockley, and become professor of surgery at the Eclectic Medical College of Pennsylvania) in establishing another school in February, 1860. They revived the American College of Medicine which had held only one term (1853), and organized a Faculty for it. On February 15, 1860, the Pennsylvania Legislature chartered this college under the name "The American College of Medicine in Pennsylvania and Eclectic Medical College of Philadelphia" (see table of genealogy). For a number of years conflict raged between the two schools, with charges and counter charges flying back and forth between them. We give a few examples:

From the Eclectic Medical Journal of Pennsylvania, Organ of the Eclectic Medical College of Pennsylvania

"SPECIAL NOTICE TO THE PROFESSION—INJUNCTION TO BE APPLIED FOR.

On account of the unprecedented course pursued by a late member of our Faculty in assuming, pretending and falsifying, by stating that he "reorganized" an Eclectic school, it is now under consideration by the Trustees of the Eclectic Medical College of Pennsylvania to apply to the Supreme Court of this State for an injunction to restrain said individual from using or pretending to use any of our lawful titles, or assuming or pretending to assume any relation or fellowship to our school.

The Charter of the American College of Medicine under which this idiosyncrastic [sic] individual pretends to work is in the possession of another party; the supplement to this charter under which he assumes to issue diplomas is a gross fraud, as the records at Harrisburg will prove. He also announces to give a course of lectures, and invites the unknowing to attend and give their money, their time, their best energies, for what? For nothing but a piece of worthless parchment, without the title of a chartered institution being endorsed thereon. We would merely caution students against this trap." (1863)

"NOTICE

From our announcement, enclosed in present number, it will be perceived that our introductory lectures begin October 1st; the regular College Session about a week later. We therefore trust that Students will endeavor to be with us in the early part of the month. To avoid parasites who feign to be medical gentlemen; to avoid the snares and bombastic allurements of illegitimate trucksters in medicine; to avoid the most debasing pedagogues of the age, students would do well to come directly to the College, N.E. corner of Sixth and Callowhill streets, on their immediate arrival in this city, where the Dean or some member of the Faculty will be in attendance, see to their comforts, and aid them in procuring a comfortable home during their winter studies.

Such a course is desirable, because there are dupes, and villains of deepest dye, who live by deceit, falsehood, and a betrayal of their very humanity, and assume to be Eclectic Teachers, when there is neither truth nor a spark of manhood in their souls." (1863)

"TO THE PROFESSION.

Every member of the Eclectic profession becomes interested for the character and integrity of those institutions which are the central sources of medical education, and which impart vitality and authority to the whole fraternity. Every one will concede that a Medical College should be based on a legal character. It is with such views that we publish, in this number, the character of our school, and make some few references on the conduct of Dr. Paine.

1st. In the early part of February, 1860, Dr. Paine, while a member of our faculty, (Eclectic Medical College of Pennsylvania,) secretly tried to get possession of the charter of the "American College of Medicine in Pennsylvania." About the middle of February, after his intrigues were developed, he sent his resignation to the Trustees of our College, which was accepted. He lectured with us up to the 13th of February, when he and his associates organized in a house they had previously rented for the purpose.

2d. Being the Dean of our Faculty, he had possession of our Faculty books, which we obtained with much difficulty. He also had in his hands over two hundred dollars of the diploma fees of the students, which he refused to give up. By this and other intrigues and falsehoods, he persuaded several of our students away.

3d. On the 18th of February, within five days after he left our school, he conferred his *illegal* degrees upon students who had just completed their studies in our College, thus depriving this institution of her legal revenue, and the students of legal diplomas.

4th. In 1860, he issued a disgraceful pamphlet, pretending to give the history of the Eclectic profession, in which he utters many falsehoods, and speaks of "re-organizing the Eclectic College." This Baron Munchausen never re-organized the Eclectic College. As stated, after his plans to injure us were developed he sent in his resignation, which stands recorded on the records of the Board of Trustees of the Eclectic College.

5th. In the fall of 1860, Dr. Paine, with a seceder from our school, by the name of Dr. Davidson, of Milford, Delaware, made overtures to several of our students, by calling at their lodging-rooms late at night, offering them Paine's tickets at five dollars each. This we have in the handwriting of the students.

6th. He says his College was "organized in 1848." This is a palpable untruth. The American College charter, which he pretends to possess, was granted in 1843. It held a short session; did not grant a single degree; then closed up its business, leaving its charter and archives in the hands of Prof. Wm. F. Smith, now a member of our Faculty. Dr. Paine, with some of his associates, obtained a copy from Harrisburg; and also, a supplement, viz: "And the Eclectic Medical College of Philadelphia." This was evidently done with the view to deceive the profession, by making them believe that he represented the regular school.

7th. He advertises a "Fourteenth Annual Commencement of the *Regular* Eclectic Medical College." This is untrue. He never organized his imitation until 1860, when he granted illegal degrees in five days after he left our College, and the only *regularity* about it is, his persistent and wicked untruths.

8th. He states that he commenced the publication

of a Journal in 1857. This is, also, untrue. It commenced in 1858, when our Faculty gave him two hundred dollars; and in 1859, one hundred and fifty dollars to aid in supporting it. In 1860, he used it as an untruthful medium to break down our institution. We took him from obscurity in Ohio; placed him before the public and the profession; placed our archives and business in his hands; and when he thought he had sufficient strength to destroy those who had built him up, he exhibited his true character. Certainly we have repented the taking of such a viper into our confidence.

9th. Does Dr. Paine hold a valid medical charter? We say no. He has only the *copy* of a charter that he obtained from the records in Harrisburg; just the same as any one else can get by applying for it. On this copy of the charter, he has not the seal of the State to give it legality. Prof. Wm. F. Smith holds the original and true charter, with the seal of the State and the signature of the Governor.

Does Dr. Paine hold a supplement to a charter? He says that he does. We have a copy of this supplement in our hands. Here it is:—

> Sec. 1. *Be it enacted*, &c., That the corporate title of the said, "The American College of Medicine in Pennsylvania," be and the same is hereby changed, and the said corporation shall hereafter be known by the name, style and title of "The American College of Medicine in Pennsylvania, and the Eclectic Medical College of Philadelphia."

Dr. Paine holds only this supplement. He does *not* possess the charter. But let us suppose for a moment that he does possess the charter, and ask this question. Has he, under it, granted any legal degrees? We say that he has not. Why? Because a diploma must show on its face the *full title* of the *charter*. Does this appear on *any* of the diplomas which he has granted? Let those who hold his degree, compare it with the above title.

But we say again, that Dr. Paine does not possess the original charter, and that he has not granted a legal degree; and he is liable to prosecution for damages by any student who has received it. Students from Canada, especially, should investigate this subject.

The above references to Dr. Paine, are but few, when compared to his numerous assaults upon our institution. Upon what we have said in the matter, we ask a careful and candid consideration from the profession. We have made no untruthful assertions; our duty compels us to unfold this disgraceful tale.

But will Dr. Paine reply to these statements? No! Because he *can not do it* truthfully. It is an impossibility. Then what are the conclusions the profession will arrive at? We will let others answer for themselves. . . .

CAUTION!

CAUTION!—We would earnestly caution our friends, our Alumni, our graduates, and the Eclectic medical profession, to be on their guard against certain parties in Philadelphia representing themselves as Eclectics, and pretending to give lectures and graduate students, when they have neither a faculty nor charter for their bogus school—neither learning nor intellect of sufficient calibre to deliver a scientific lecture—neither character nor manliness to occupy a decent position in society; indeed, all they do accomplish is by deception, lies, and a gross perversion of all that is manly. The party who pretends to conduct this one horse, unchartered humbug, without a faculty, also aspires to be an editor, whereas his weak silly effusions, his contemptible slang, are wrote by a female *amanuensis*." . . . . (1863)

". . . . There exists in Philadelphia a society, an energetic association, *for the suppression of vice and protection of females*—we only throw it out as a suggestion—why does it neglect to take this imposter in hand, and have him chastised for his unabashed rascality, and for the exposure of his lewd women?—his abominable indecencies and outrageous knavish manipulations are well known; the extent of the evil cannot be adequately discussed." (1864)

Replies of a sort, to John Buchanan, editor of the Eclectic Medical Journal of Pennsylvania, who was responsible for all of this vitriol, were made by William Paine, in his "Journal," and will be presented in the study of that school, next in this series.

Within a few years after the split (i.e. about 1864) the Eclectic Medical College of Pennsylvania began to make false claims for itself, and to engage in unscrupulous activities. It claimed that it had received an endowment of $100,000, had invested it in United States bonds, and that the fund would enable it to build a most magnificent college. The claim was only a scheme to attract students. Other extravagant tales which it told were that since 1850 it had enrolled 1464 matriculates and sent forth 873 graduates. By 1866 it claimed 1000 practicing graduates, and in 1871, 2000 graduates (see Eclectic Medical Journal of Pennsylvania for those years). Matters went from bad to worse, and from the days of relocation at 514 Pine St. tuition fees became ridiculously small and diplomas easy to acquire, neither attendance at lectures nor acquisition of much medical learning being required.

In 1867 the Legislature chartered the American University of Philadelphia, which at

FOURTEENTH ANNUAL ANNOUNCEMENT

OF THE

ECLECTIC MEDICAL COLLEGE

OF PENNSYLVANIA.

ECLECTIC MEDICAL COLLEGE OF PENNSYLVANIA.

N. E. cor. Sixth & Callowhill Sts. PHILADELPHIA.

COLLEGE BUILDING,

NORTH-EAST COR. OF SIXTH & CALLOWHILL STS.

The only regular Chartered Eclectic Medical College in the State of Pennsylvania.

Holds Two Sessions Annually—Winter Session Commences October 3d, 1864; Spring Session Commences February 1st, 1865.

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JOSEPH SITES, M. D., 892 North Sixth Street, Professor of Obstetrics and Diseases of Women and Children.

HENRY HOLLENBAEK, M. D., N. E. corner of Sixth and Callowhill Streets, Professor of Materia Medica and Therapeutics.

JOSEPH P. FITLER, M. D., 992 North Second Street, Professor of Chemistry and Toxicology

JOHN BUCHANAN, M. D., 1809 Callowhill Street, Professor of the Principles of Surgery

M. N. MILLER, M. D., 1133 Race Street, Professor of Anatomy and Operative Surgery

W. CLARK, M. D., 881 North Eighth Street, Professor of Theory and Practice of Medicine and Pathology

JOHN WATSON, M. D., 321 North Sixth Street, Professor of Military Surgery.

E. D. FARR, M. D., 33 N. Twelfth St., Professor of Physiology and Institutes of Medicine.

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JOSEPH SITES, M. D., 892 North Sixth Street, Dean of Faculty.

Matriculation Fee, $20. | Diploma, $25.
Course of Lectures, $60 | Demonstrator's Fee, $5.

☞ Fifty Students will be taken free, on payment of Matriculation Ticket.

FIG. 1. Advertizement facing p. 176 of *The Eclectic Medical Journal of Pennsylvania*, vol. 2, 1864; reproduced from the copy in the Library of The College of Physicians of Philadelphia.

first existed as an associate institution, the style being "The American University of Philadelphia and Eclectic Medical College of Pennsylvania. Later the two "fused" into one. The school was now a diploma mill, selling its product widely, for which reason it was read out of the company of the American Eclectic school of medical practice (1869 and after). The Pennsylvania Legislature passed a bill to repeal the 1850 charter, by authority of an 1857 amendment to the Constitution, only to find itself over-ruled by the Supreme Court (Allen vs. Buchanan), the legal principle being that the Legislature could not repeal a charter which had been granted prior to the amendment which gave it the power to so repeal. The College then accused Paine's school, the University of Pennsylvania, and "a journal under the control of Jefferson Medical College" of being behind the effort to close it down.

The prime mover in the diploma mill operation was Dr. John Buchanan. Obtaining the charter of the American University of Philadelphia was the work of his hands. The diploma of the University was deliberately designed to simulate that of Paine's school, which by now was known as the "Philadelphia University of Medicine and Surgery," so that the resemblance extended beyond the diploma, to that between the names of the two schools. The "National Board of Health Bulletin," volume 1, number 42, April 17, 1880, page 323, tells of the frequent notices received by Commissioner John Eaton, of the U. S. Bureau of Education, stating that fraudulent diplomas were circulating in this country and abroad. The latest notice was from Mr. Andrew D. White, United States Minister at Berlin, who reported that a Mr. Pappenheim had shown him a handsomely engrossed parchment diploma, dated 1872, (but obviously new,) conferring the degree of doctor of medicine, by the American University of Philadelphia, upon Christopher Schuetz, of Leipzig, and signed by Buchanan and other "faculty" members. Schuetz had requested a certificate of "genuineness of the diploma," which Mr. White refused to give him. The authorities at Prenzlau, shortly thereafter, produced a copy of a diploma from the same school also signed by Buchanan, and issued to Paul Christoph Erdmann Volland. They requested information as to the authenticity of the diploma, before accepting Volland as a practitioner. Mr. White could not find the school in the list published by the Bureau of Education, and therefore gave the authorities an unfavorable report, then forwarded a copy of Volland's diploma to the U. S. Commissioner, with the observation that our country was losing the respect of learned circles abroad because of the sale of "unmerited diplomas by irregular institutions." The worst of it was that Volland's diploma was certified by Philip A. Cregar, notary public, and William B. Mann, prothonotary, thus showing that Pennsylvania officials were allowing themselves to be used to support the posture of the Eclectic Medical College and American University of Philadelphia as a "regularly incorporated institution in good standing." This was considered by Mr. White to be more serious than the diploma itself. (The method for distinguishing between a genuine and a bogus diploma will be given in a future article.) Mr. Eaton's circular letter to educators, and others, resulted in the exposure of the American University and Eclectic Medical College of Pennsylvania as purveyors of spurious medical degrees. Other schools in our country and abroad had been granting degrees "in absentia" but the Eaton investigation came to an end as soon as the imputation of the fraudulence of some of the Eclectic schools had succeeded. This was so, despite the known fact that some schools in high standing also had sold diplomas, one school even more diplomas than that of Buchanan.

With the arrest of Buchanan in 1880 the sale of fraudulent diplomas and the life of the Eclectic Medical College of Pennsylvania-American University of Philadelphia came to an end.

The Transactions of the American Medical Association, volume 32 (1881), pages 41–47, reproduce a number of letters from the

Commissioner of Education, the Department of State, the American Legation in Berlin, the Volland diploma, Cregar's notary's certificate and Mann's prothonotary's certificate. These pages tell of Buchanan's exposure by one of the editors of the Philadelphia Record and the further discovery that Buchanan, under the name of James Murray, D.D., was selling diplomas issued by Livingstone University of Haddonfield, N. J., Philadelphia and or Charlestown, West Virginia. Buchanan pretended to commit suicide (by jumping into the Delaware River from a Philadelphia-Camden ferry-boat), but was found alive in Canada, enticed over the border into Michigan, and there arrested.

Mr. White's letter to William Evarts, Secretary of State, referring to the disgrace which Buchanan brought to America's fair name and system of higher education, tells of a very successful play, then running at the Royal Theatre of Berlin, and written by a judge of one of the highest German tribunals. In the play one of the characters sneers at another character, a doctor, by saying that the doctor had bought his degree in America. Likewise, a popular novelist has the scoundrel of his book escaping justice in Germany, by fleeing to America, where he settles down comfortably to a medical practice, with a sham diploma purchased for the purpose. Thus low had respect for America sunken.

Similarity of Names of Colleges and Journals

The welter of names of institutions and publications with similar sound would seem to make it desirable to say a word of caution about them. The reader should be on his guard against confusing (I) the American University of Philadelphia (associated with (II) the Eclectic Medical College of Pennsylvania) with either (III) the American College of Medicine (revived as (IV) the Philadelphia University of Medicine and Surgery) or (V) the Philadelphia College of Medicine. Nor should (VI) the Medical Department of Pennsylvania College be confused with (VII) the Penn Medical University, or (II) the Eclectic Medical College of Pennsylvania, or (VIII) the University of Pennsylvania. One should also beware of confusing (II) the Eclectic Medical College of Pennsylvania with (IX) the Eclectic Medical College of Philadelphia (later known as (IV) the Philadelphia University of Medicine and Surgery), or (IX) with (II) or (IV) with (V).

The journalistic organs of college II and college IX likewise had names which are easily confused. *The Middle States Medical Reformer and Journal of Health* had begun its existence in 1854. The editors were Drs. Palemon John and J. S. Prettyman. In 1858 it became the monthly *Eclectic Medical Journal of Philadelphia*. The editor was now William Paine, at the moment a member of the faculty of the Eclectic Medical College of Pennsylvania, and the journal was therefore the organ of the Eclectic Medical College of Pennsylvania. Thus the journal with "Philadelphia" in its title was the organ of the college with "Pennsylvania" in its name. When Paine opened the Eclectic Medical College of Philadelphia, the journal became the organ of that school. Eventually, with the change of the name of Paine's school to the Philadelphia University of Medicine and Surgery, the magazine became *The Philadelphia University Journal of Medicine and Surgery* (1865). The last volume was number 14, (1871).

The Eclectic Medical College of Pennsylvania, with its journal now in the hands of the rival school, founded the *Eclectic Medical Journal of Pennsylvania*, Volume 1, Number 1 being the issue for January February, 1863. John Buchanan was editor-in-chief by 1867 and remained editor until its demise, (volume 18), in 1880. Under him it claimed (1868) to have the largest subscription list of any medical journal in the United States and that it circulated in every part of the civilized world. In 1872 he stated that the circulation averaged 6000. In 1875 he laid claim to a circulation of 10,000. (In 1876, under Buchanan's magnifying glass, there were 12,000 Eclectic medical graduates in North America and 12,000 others practicing non-

graduates, making a total of 24,000 such physicians).

1. BUILDINGS AND EQUIPMENT

The first home of the College was located on Haines Street, (between Arch and Race) west of Sixth, where instruction was carried on until the year 1858, and then the College obtained a location at the northeast corner of Sixth and Callowhill Streets.

The building at Sixth and Haines Streets had facilities for chemistry and other lectures on the first floor, a well stocked museum, ample for illustrating all branches of a thorough medical education, on the second, and an amphitheatre and dissecting rooms, well lighted and ventilated, on the third. Despite its location in the central section of the city it was "retired from the confusion of business." In 1855 the entire building was painted, papered, and repaired, water and gas installed, the portion for anatomy greatly enlarged, and many new and rare specimens added to the museum. The appearance, comforts, and conveniences were thus improved.

In 1868 the College purchased the ground and mansion at 514 Pine St. and "erected new and commodious halls, lecture-rooms, suitable apartments for chemical laboratory, library, reading, clinic and dispensary rooms." The first floor was devoted to the museum, which held illustrative material for lectures, the apparatus and cabinets of the various professors, the various new preparations and imported models of anatomy, pathology, obstetrics and surgery. The rear housed a "splendid laboratory" for practical and experimental chemistry, open daily, all year, from 8 A.M. until 6 P.M., under the care of the professor of chemistry and his assistants. On the second floor the main hall was devoted to lectures on theory and practice of medicine, pathology, chemistry, materia medica, jurisprudence and physiology. This hall was "well lighted and thoroughly ventilated, and capable of accommodating three hundred students." There was a "magnificent library and reading room" on the same floor. On the third floor there was "one of the finest amphitheatres in the country," seating over three hundred students, for lectures on obstetrics, anatomy and surgery. On the fourth floor there were accommodations for twenty tables for practical anatomy. This room was open daily from 7 A.M. until 6 P.M. The building also had trustee and faculty rooms, clinic and dispensary "apartments." There was also a dental laboratory. All the halls and apartments were supplied with gas, water and all modern comforts.

The College claimed the museum to be replete with preparations, materials, apparatus, drawings and all other equipment needed as illustrative material for teaching all the branches of medicine. The obstetrical cabinet had manikins, wax preparations, plaster and papier maché models and all requisite appliances for illustrating parturition, many paintings, drawings and engravings, "colored from nature," and many very well preserved and valuable pathological specimens. The materia medica cabinet had a complete and well preserved collection of remedial agents, active principles and concentrates such as were used by Eclectic physicians, and a collection of colored illustrations of plants having interest for the study of medicine. (On display, in this subject, were specimens from which a student could learn the appearances of the various medicines, also the latest formulas and mode of preparation, thus enabling graduates who settled in localities too far removed from manufacturers to prepare the medicines themselves). There were herbarium specimens. The anatomical collection included the usual osseous, ligamentous, nervous, vascular, muscular and other wet and dry preparations, 300 anatomical plates, and many valuable and interesting pathological specimens (heart, stomach, liver). The surgery department had its supplies and equipment (fractured bones, models, paintings) and the chemistry department had extensive supplies and apparatus. The professor of diseases of the eye and ear illustrated his lectures with two hundred and fifty "splendid" wax preparations

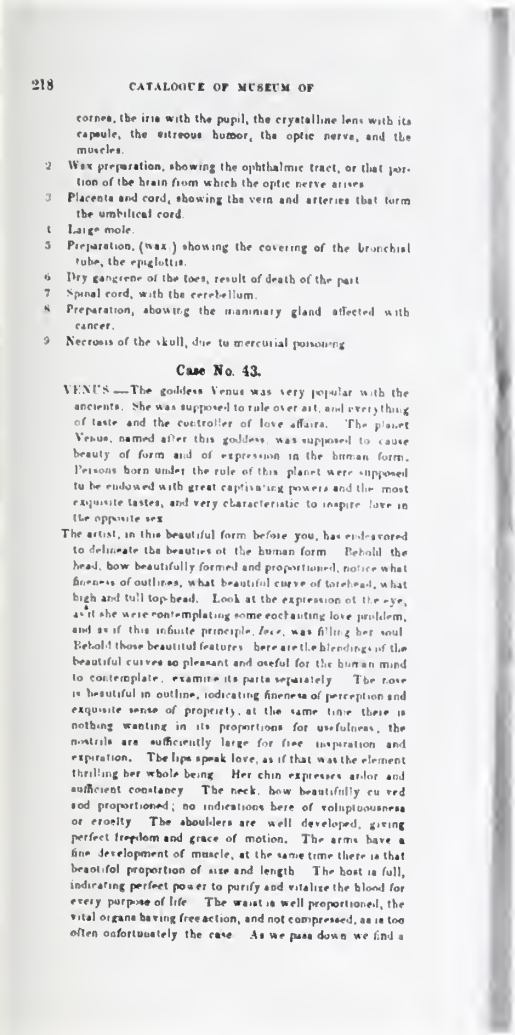
which he had imported from Paris. For the use of students in the course in microscopical anatomy, there were microscopes for magnification of from 250 to 2500 diameters. In the last years of its life the College claimed an oxy-hydrogen light for magnifying drawings in the lecture room.

The Museum

The Eclectic Medical Journal of Pennsylvania for July 1871 (volume 9, number 4) devotes pages 194 to 224 to a listing of the entire catalogue of the College museum. Preceding the catalogue is the statement:

"We append, in this number, an abbreviated catalogue of our museum one of the most magnificent in the United States. It will give physicians and students an idea of the brilliant intellectual feast they will receive in our College, where all the lectures are illustrated by some of the specimens enumerated therein."

There were sixty cases, containing 2500 specimens of an endless variety and interest to students of the sciences basic to medicine.



218 CATALOGUE OF MUSEUM OF

cornea, the iris with the pupil, the crystalline lens with its capsule, the vitreous humor, the optic nerve, and the muscles.

2 Wax preparation, showing the ophthalmic tract, or that portion of the brain from which the optic nerve arises

3 Placenta and cord, showing the vein and arteries that form the umbilical cord.

4 Large mole.

5 Preparation, (wax) showing the covering of the bronchial tube, the epiglottis.

6 Dry gangrene of the toes, result of death of the part

7 Spinal cord, with the cerebellum.

8 Preparation, showing the mammary gland affected with cancer.

9 Necrosis of the skull, due to mercurial poisoning

Case No. 43.

VENUS.—The goddess Venus was very popular with the ancients. She was supposed to rule over art, and everything of taste and the controller of love affairs. The planet Venus, named after this goddess, was supposed to cause beauty of form and of expression in the human form. Persons born under the rule of this planet were supposed to be endowed with great captivating powers and the most exquisite tastes, and very characteristic to inspire love in the opposite sex

The artist, in this beautiful form before you, has endeavored to delineate the beauties of the human form Behold the head, how beautifully formed and proportioned, notice what fineness of outlines, what beautiful curve of forehead, what high and full top-head. Look at the expression of the eye, as if she were contemplating some enchanting love problem, and as if this infinite principle, *love*, was filling her soul Behold those beautiful features here are the blendings of the beautiful curves so pleasant and useful for the human mind to contemplate, examine its parts separately The nose is beautiful in outline, indicating fineness of perception and exquisite sense of property, at the same time there is nothing wanting in its proportions for usefulness, the nostrils are sufficiently large for free inspiration and expiration. The lips speak love, as if that was the element thrilling her whole being Her chin expresses ardor and sufficient constancy The neck, how beautifully curved and proportioned; no indications here of voluptuousness or cruelty The shoulders are well developed, giving perfect freedom and grace of motion. The arms have a fine development of muscle, at the same time there is that beautiful proportion of size and length The bust is full, indicating perfect power to purify and vitalize the blood for every purpose of life The waist is well proportioned, the vital organs having free action, and not compressed, as is too often unfortunately the case As we pass down we find a

gradual increase of the width of the body, indicating a full development of the pelvic bones, expectating the female form for performing the divine offices of woman The form and proportions of the lower extremities can only be possessed by vigorous exercise in nature's pure air In short, we have here, as it were, in microcosm condensed, all the beauties of the Universe; also, there is a sublime adaptation of every part to its divine purpose Let us, then, endeavor to perfect this citadel by living good, virtuous and loving lives

Case No 44

1 Fungus hematodes of the eye.

2 A well marked case of skin disease.

3 Section of the brain of the drunkard

4 Base of the brain of a person who died from congestino at the base of the brain.

5 Large tumor on the dorsum of the hand.

6 Bifid or double uterus.

Case No 45.

MARS, or the God of war.—The planet Mars, in the astrological age, was supposed to cause and govern war; also, to stir up all kinds of contentions and quarrels You have in the figure before you a physical form, eminently adapted, physically and mentally, to carry out the spirit or influence of Mars.

You cannot see in this figure any expression of the finer and nobler feelings, but, on the contrary, the square features indicate force animal force and prowess The forehead, its form and wrinkles, indicates intellectual obtuseness and inactivity the declining back top-head indicates that such a person would be entirely under the control of the baser passions, being a stranger to any moral restraint. Physically considered, this figure is grand, showing what gymnastic exercise and physical training will do for the human form What a muscular development of the neck, and otherwise every indication of strength Consumption could not take place in such a formed chest Notice the comparative width and depth, notice the comparative size of the limbs, the muscular development is enormous, and can only be attained by systematic and continuous exercise In short, we have, in this form, almost perfection physically, and when we remember how much of our well-being and happiness in this life depends upon health and a vigorous physical constitution, we can readily see our duty

Case No 46.

1 Prolapsus hypertrophy of the cervix

2 Prolapsus falling of the Uterus

3 Prolapsus inversion of the vagina.

4 Hermaphrodite. History by Dr B.

FIG. 2. Quaint descriptions of Venus and Mars: gods on display. The entire catalogue of the college museum is reproduced in *The Eclectic Medical Journal of Pennsylvania*, Volume 9, number 4, (July, 1871), pp. 194-224. Above are two pages of this catalogue.

The catalogue claims a number of manikins, described with keen delight. For example:

"Case No. 41 Eve in the garden of Eden with the apple in her hand. A magnificent full-length figure of the mother of our race. . . ." etc.

(For a description of the figures Venus and Mars, see the illustration.)

The College requested all who graduated to present their alma mater with some specimen or other, not so much for the value of the item, but because the College wanted everyone represented in this effort. (See below.) It will be noted that a "curator" was a member of the 1876 Faculty. (He may have been in charge of the museum that year, when many Centennial visitors to the museum could be expected.)

Case 52 might have been assembled by a nineteenth century equivalent of a present-day television comedian. It brought together: an amputating case, the first number of the Public Ledger (for March 25, 1836), the key to Libby Prison, Continental currency, stones from the ruins of Pompeii, the oldest stethoscope in the world, (used by Laennec, and handed down from one person to another until it reached Buchanan), certain medical instruments, and, finally, (number 17) skins of murderers.

II. CURRICULUM

The very first session of the College ran for a period of four months (October 27, 1851 until March 1, 1852), but by 1857 the Fall session ran only from October 15 to the end of the following January. There were five or six lectures a day, each aiming at clarity and practicability, with great attention to principles and every-day practice, "with-out encumbering the mind with useless theories of the past ages." In addition, each lecturer followed his discussions of Eclectic principles by a synopsis of "Old School" doctrines, for comparison as well as instruction, so that graduates would know both systems and the "benefits and errors" of the "Old," i.e. "the superiority of the Eclectic or Reformed treatment (Pathologically and Therapeutically considered)," thus giving the graduate a double preparation as a physician. There were, of course, stated examinations, so that the professors could see how well the learning process was progressing.

In principles and practice of surgery emphasis was upon simplicity and practicability disease, its causes, effects, emphasis upon prevention rather than cure, the best-devised means for relief, a comparison of the treatments of the different systems, etc. Attention was given to recent improvements in constitutional and local treatment of surgical diseases, operations, reduction of fractures, dislocations and dressings. By 1857 all the minutiae of operative and mechanical surgery were being demonstrated by operations before the class. Instruments, splints, bandages, dressings of various kinds and mode of application were shown, with particular attention to fractures, dislocations, ligature of arteries, amputation, etc.

In theory and practice of medicine the professor aimed at teaching all that he thought useful and instructive both in the Eclentic and other prevailing systems of medicine. He emphasized more minutely the vegetable medicines, but did not ignore those from the animal or mineral kingdoms, if these were "known to act in unison with the laws of life and health," i.e. would cure disease, with the least possible injury to the system or to the "vital force." Where practicable he pointed out the benefits of other systems when employed separately or in conjunction with each other, "thus realizing the proper idea of Eclecticism." In 1854 the incumbent professor considered

"the pathology of disease, . . . and Electro-Magnetism as having a bearing upon chronic disease in particular—that form of it . . . . denominated tubercular [was] thoroughly unfolded, and its wonderful results in the removal of this description of disease . . . fully and triumphantly established."

During the time that Dr. Paine, who gave great attention to inflammatory diseases and fevers, was professor, he attended the clinics at

the Pennsylvania Hospital, then reviewed the Allopathic treatment there prescribed, and explained to his students the Eclectic treatment, as he would have applied it to each case. In Dr. Fondey's time the number of lectures was twice that in similar courses elsewhere, and general and special pathology were emphasized.

The professor of obstetrics and diseases of women and children emphasized prevention as well as cure, and taught all important phases of the subject, (using many illustrative aids)—structure and uses of the pelvis and genital organs and their diseases, pregnancy from the standpoint of physiology and pathology, the varied forms of labor (taught with the aid of a female manikin representing the foetus in utero) and the Eclectic treatment of the forms of gestation "from the first month to its ultimatum." (The claim was entered that the Eclectic treatment in this field surpassed in excellence any other known treatment). The College claimed to be in possession of the best and most extensive collection of foetuses of any American college, a collection of wax preparations representing the different stages of gestation, specimens of gravid uterus not excelled by the "Old" colleges of the city, a large collection of paintings, representing the various kinds of labor, the process of turning and other important operations, and a collection of female pelves with natural ligaments attached. Craniotomy upon the dead foetus, and operations for difficult cases of parturition were performed in the presence of the class by the professor.

The course in materia medica was intended to give a comprehensive and practical view of all the principal medicinal agents. Those substances whose prominent powers resembled each other would be classed together and general remarks made upon their peculiar therapeutic action. The natural, chemical and commercial histories of each substance, as well as dose and mode of administration were taught. Attention was drawn to the peculiar stage of disease and condition of the system that called for the use of each article, and the results which could be expected. After each class of medicinal agents in the Eclectic materia medica was reviewed, those prominent and injurious agents of the "Old School" not accepted by the "New," were considered, and the differences shown. Thus the student came to know the weak or dangerous results of the agents in use by all other systems, and the reliance which he could place in his own Eclectic remedies, as these did not conflict with the natural functions of the human system. Objections to the use of mercury, arsenic, antimony, zinc, copper, lead and other deleterious agents, and the lancet, were dwelt upon, and the safe and effectual vegetable remedies of the Eclectic practice shown to be competent to meet all needs. Special stress was laid upon medical botany and all the medicinal plants found in our own country. (In our discussion of the museum, above, reference has been made to methods of preparing certain medicines). Dietetics was emphasized.

The professor of chemistry taught the general principles and the manipulations of experimental chemistry, followed by their applications to pharmacy, physiology and therapeutics. Attention was also given to practical analysis, the best means of detecting the presence of poisonous matter, the action of antidotes and the medical and chemical treatment of accidental or intentional poisoning. Thus organic chemistry, in relation to physiology, diagnosis and analysis of plants was fully taught. Medical jurisprudence was also a part of the course. In 1863 "a new feature in the College" was the appointment of a professor of organic chemistry, "deemed essential . . . . to carry out the proper principles of Eclecticism. . . ." By 1868 chemistry and toxicology at the College had become mainly organic chemistry. In 1871 the College, "in order to meet the wants of the profession, as regards important specialties in Medicine, Surgery and Midwifery," offered special instruction, independent of the regular College course, in urinary diagnosis or uroscopy, (in which the urine of 200 patients weekly was examined chemically and microscopically),

and in analytical chemistry and toxicology. At about this time the College claimed an excellent laboratory, completely equipped with apparatus, and individual instruction in qualitative and quantitative analysis, "pathological chemistry" and chemical research. Graduation requirements included "practical" chemistry, as well as "practical" anatomy.

Anatomy and physiology had more time than usual lavished upon them, in order that a fuller understanding and mastery should result. Anatomy was taught in detail, particularly in its general, descriptive and surgical relations. The structure and function of all the organs of the body, both in health and in disease were explained. Students were afforded an opportunity to examine each organ after the lecture upon it, thus adding to their knowledge of it gained in the dissecting room. Histology, and comparative and pathological anatomy were included. Dr. Calkins' statement of his course ran, in part, as follows:

"In order to impress upon the memory of the student the facts in anatomy, the professor will meet the class every evening, or at least four evenings in a week, and review the subjects of his public lectures, and propose such questions to the class as will tend to call out the ideas of the student. Regional anatomy and its relations to surgical operations will be thoroughly impressed upon the mind. The professor, in connection with the demonstrator, will, from time to time, give lectures to the dissecting classes concerning the method of making dried preparations, the proper use of instruments in dissections, and the method of making post-mortem examinations. The origin and accurate definition of anatomical terms will be so taught as to enable the student, on the principle of association, to recollect them.

The course on physiology will comprise vegetable, comparative and human physiology. Under the head of human physiology, the minute construction of tissues, the constituents of the blood, the kind of food necessary to its healthy state, and for the repair of the tissues, will be fully considered. The absurdity of depletion will be proved; the philosophy of diaphoresis, in the cure of disease, will be so shown as to substantiate, by sound and scientific argument, the superiority of the Reformed Eclectic Practice. The philosophy of emesis, and the danger of poisonous emetics are considered. This science is shown to be the only certain guide to all scientific medication. The minute physiology of digestion, its normal and abnormal condition in somnambulism, mesmerism, mental obstruction, insanity and delirium, are fully discussed. All the facts in physiology will be considered in a practical light, and from them such deductions will be drawn as tend to aid the practitioner in the selection and application of remedial agents to the cure of disease." (1855)

The dissecting room was under the guidance of the professor of anatomy, and provided the opportunity of acquiring a detailed knowledge of practical anatomy, pathology and the use of surgical instruments. All students, particularly those in the graduating class, were urged to participate in dissecting and in amputating limbs, ligaturing arteries and in performing all the important surgical operations upon the cadaver, as a proper basis for training in surgery, as well as for the purpose of preparing specimens for preservation.

"It is particularly requested of the student, that he will make, with his own hands, a fair dissection of some part of the body for a dried specimen, and leave it, with his signet upon it, in the Anatomical Museum. This will show to future times the connection which existed between the student and the institution, and will be a lasting memorial of his artistic skill and self-sacrificing spirit. It will, also, be enlarging the Anatomical Museum, and thus securing the future prosperity of the college, which cannot fail to cheer the heart of every alumnus."

Students of the College had access to the hospitals and dispensaries of the city, upon the same conditions as those of other schools of medicine. In addition, there were clinical lectures, (medical and surgical), at the College on Wednesday and Saturday mornings. Eclectic physicians in Philadelphia and vicinity were invited to bring difficult surgical cases to the clinic, for the benefit of both patients and students.

In 1864 courses in military surgery and dental surgery were announced. The course in military surgery, given by Dr. John Watson embraced, in addition to major and minor surgery, all subjects of importance to those who minister to the medical needs of soldiers in the field—efficiency for active service, diet, clothing, ventilation, drainage, general means of preserving health, gunpowder burns, gunshot, sabre and bayonet wounds, cholera,

dysentery, sunstroke, intemperence, syphilis, etc. Provision was made for obtaining experience in the minutiae of the surgeon's art. In 1867 announcement was made that the 1867–68 sessions would include daily clinical lectures on the cause, history, symptoms, pathology and treatment of medical and surgical cases, and on the employment of the microscope, ophthalmoscope, otoscope, laryngoscope, endoscope, thermometer, percussion and auscultation in recognizing disease, and instruction given in the microscopical and chemical examination of urine and the microcopical observation of tissues and fluids in health and disease.

A course in midwifery and diseases of women and children was announced for the summer of 1867. Three lectures per day, for two months, were scheduled, leading to a diploma in midwifery.

A list of the nineteen subjects in the entire course (as early as 1855) was as follows: anatomy (descriptive); histology; surgical and topographical anatomy; comparative anatomy; microscopic anatomy; physiology, comparative and human; medical jurisprudence; surgery; chemistry and toxicology; organic chemistry; materia medica; medical botany; hygiene; therapeutics; general and special pathology; institutes of the theory and practice of medicine; obstetrics; diseases of women and children; embryology. Later announcements (1872 and on) listed special and optional courses in physical diagnosis, microscopy, uroscopy, electricity, skin diseases, eye and ear, hygiene, nervous diseases, laryngoscopy and venereal diseases. By now the College was claiming to be

"... the only University in the United States where the immutable principles of Thompson, the immortal doctrines of Beach, the progressive principles of Eclecticism in medicine are taught in their purity—the true American system of practice—which has been so successful in contra-distinction to those miserable importations—Allopathic and Homeopathic—fossil relics of a barbarous age and of benighted Europe."

"Any poor man, who believes in Eclecticism and the American system of practice, who is unable to pay the above fees (matriculation $5.00, tickets of the entire Faculty, for one course $30.00, diploma $30.00), if recommended by a liberal physician, will be taken free of all expense."

The College announced in 1872 that "the oldest University in New Jersey and one in central New York" had arranged "to enter and educate their medical students in our Institution."

Two proud claims made a few years later were that the College taught the germ theory of disease, and that there now existed the Eclectic Pharmacopoeia, which introduced nearly 200 new remedies. (A brief announcement made at this time refers to the fact that there were "separate classes" for the sexes).

The College announced that the Centennial Year (1876) would be celebrated by the College in the form of a course of lectures by distinguished physicians. According to an announcement in the Eclectic Medical Journal of Pennsylvania (1873), in preparation for this event the height of the school building had been raised thirty feet by the addition of another story, and reading rooms and chemical laboratory had been improved. Weekly importations of museum materials from Paris were being made. Professors Newton, of Missouri, Edward Payne, of Canada, Burk of Texas, Brown of Illinois, Livingstone of New York, Henderson, of Ohio, etc. had volunteered to give these lectures and would be awarded the gold medal of the University (struck off at the United States Mint) as "Centennial Professors." The lectures would run from May 10, 1876 until July 4th, and would deal with important recent practical discoveries in the practice of medicine, midwifery and materia medica. A fee of $65 would cover the cost of lectures, material and diploma.

(Another interesting offering by the College was an announcement that a special course would be organized for workingmen. This would consist of two lectures per evening (7 to 9 P.M.) for five evenings per week, October 1878 until May 1879.

"... This will bring a fresh, vigorous element of talent into the domain of medicine, and aid in extirpating the imbecility of allopathic graduates. The tendency of allopathy is to despotism, high fees, long terms; any

method to retard a working man. We believe in proficiency, eminence and skill, but in democratic medicine.")

The number of sessions per year varied from time to time. In 1858 it was determined to hold only a Fall–Winter session, but by 1864 two sessions were being held, ("six or seven lectures daily, with two hours of demonstrating every evening."), and in 1868 a plan to hold three distinct sessions was instituted, the Regular Winter session running from early October to the end of January, the Spring session from February 1 to about May 1, and the Summer session from May until October 1, excluding the months of July and August. The Summer session, the purpose of which was to prepare students for the Winter course, consisted of four lectures daily, selected from anatomy, surgery, chemistry, materia medica, physiology, obstetrics and practice of medicine, and two clinical lectures, at the Bedford Street Charity, on diagnosis, percussion, auscultation, urinary tests, etc., and operative surgery. This clinical instruction required the services of three clinical professors, (in addition to the seven "regular" and six adjunct professors of the College). Clinical lectures amounted to twenty-two per week—two daily at Bedford, four weekly at the College, four at Philadelphia hospital, and two at the Eye and Ear (Wills') Hospital.

Schedule of Clinical Instruction at Bedford Street Charity 1868–69
(Beginning at 11:30 A.M.)
Monday: Practical Medicine, Operative Surgery
Tuesday: Fevers, Venereal Diseases
Wednesday: Diseases of the Chest, Fractures
Thursday: Practical Midwifery, Diseases of Women and Children
Saturday: Nerve Affections, Blood Diseases

In 1869 the length of the Fall session was reduced to three calendar months. (Each of the three sessions was followed by a graduation).

Requirements for Graduation

A candidate must have attained the age of twenty-one years, have pursued the study of medicine for the previous three years, and must give evidence of having a good moral character and a "fair English education."

He must have had two full courses of lectures in a chartered and reputable medical school, at least one of those courses being at this college.

He must present a thesis, on some medical subject, in his own handwriting.

He must pass an examination. (About 1872 "the performance of practical anatomy and chemistry" were added to the requirements for graduation, as was the "sustaining of satisfactory examinations—including at least two written examinations by each professor during the term.")

III. (A) FACULTY

Session of 1851–52

Thomas Cooke, M.D., President and Dean
S. J. W. Mintzer, M.D., Registrar
Henry Hollembaek, M.D., Librarian
Joseph Sites, M.D., Curator of the Museum
Stephen H. Potter, M.D., Professor of the Principles and Practice of Surgery.
Thomas Cooke, M.D., Professor of the Theory and Practice of Medicine.
Joseph Sites, M.D., Professor of Obstetrics and Diseases of Women and Children.
Henry Hollembaek, M.D., Professor of Materia Medica and Therapeutics.
S. J. W. Mintzer, M.D., Professor of Anatomy and Physiology.
(Name of Professor of Chemistry not yet announced)
S. J. W. Mintzer, M.D., Demonstrator of Anatomy

Session of 1853–54

Thomas Cooke, M.D., Dean and Professor Emeritus of Principles and Practice of Medicine.
Joseph Sites, M.D., Professor of Obstetrics and Diseases of Women and Children.
Henry Hollembaek, M.D., Professor of Materia Medica and Therapeutics.
S. J. W. Mintzer, M.D., Professor of Institutes and Practice of Surgery.

Thomas G. Chase, M.D., Professor of Chemistry.
Hamilton McDowell, M.D., Professor of Anatomy and Physiology.
John Fondey, M.D., Professor of Principles and Practice of Medicine.
Philip A. Brackett, M.D., Demonstrator of Anatomy.

Session of 1854

The Faculty was the same for this session as that for the Session of 1853–54, except that Dr. McDowell was replaced by Dr. Marshall Calkins, Dr. Brackett was no longer Demonstrator of Anatomy (his successor is not named in the announcement for that year), and, Dr. Cooke, while remaining Emeritus Professor, handed on the deanship to Dr. Fondey.

Session of 1855–56

Joseph Sites, M.D., Professor of Obstetrics and Diseases of Women and Children.
Henry Hollembaek, M.D., Professor of Materia Medica, Therapeutics and Medical Botany.
Thomas G. Gates, M.D., Professor of Chemistry and Medical Jurisprudence.
John Fondey, M.D., Dean and Professor of Theory and Practice of Medicine and Pathology.
Marshall Calkins, M.D., Professor of Anatomy and Physiology.
James M. Buzzell, M.D., Professor of the Institutes and Practice of Surgery.
William Paine, M.D., Demonstrator of Anatomy.

Session of 1856–57 and Spring, 1857

John Fondey, M.D., Emeritus Professor of the Theory and Practice of Medicine and Pathology, (and Dean of the Faculty until Spring, 1857.)
Joseph Sites, M.D. Professor of Obstetrics and Diseases of Women and Children.
Henry Hollembaek, M.D., Professor of Materia Media, Therapeutics and Medical Botany.
Thomas G. Chase, M.D., Professor of Chemistry and Medical Jurisprudence.
Marshall Calkins, M.D., Dean and Professor of Anatomy and Physiology.
James M. Buzzel, M.D., Professor of the Institutes and Practice of Surgery.
William Paine, M.D., Professor of the Theory and Practice of Medicine and Pathology.
Marshall Calkins, M.D., Demonstrator of Anatomy.

Session of 1857–58

The following changes were made in the make-up of the Faculty of 1857: Dr. Joseph B. Holland became professor of Anatomy and Physiology, replacing Dr. Calkins, who had become Dean of the Faculty in Spring 1857 and now became professor of the Institutes and Practice of Surgery, in place of Dr. Buzzell (Dr. Buzzell ceased to be a member of the Faculty). Dr. Fondey was no longer Emeritus Professor.

Session of 1859–60

Dr. Chase became Emeritus professor, being replaced by J. G. Bohannan, M.D., in chemistry and medical jurisprudence. Dr. Holland was replaced in anatomy and physiology by J. H. Thomas, M.D., R. W. Appleton, M.D., became prosecutor of surgery, and William Paine, M.D., became Dean. In other respects the Faculty was the same as that of 1857–58.

Session of 1860—Spring

James McClintock, M.D. became professor of institutes and practice of surgery, with the return of Dr. Calkins to anatomy and physiology, and Dr. Thomas became demonstrator of anatomy. In other respects the Faculty was the same as that of 1859–60.

Sessions of Winter 1863–1864, and Spring 1864

Thomas G. Chase, M.D., Emeritus Professor of Chemistry.
John Mintzer, M.D., Emeritus Professor of Surgery.
John G. Rich, M.D., Emeritus Professor of Anatomy.

Joseph Sites, M.D., Professor of Obstetrics and Diseases of Women and Children.
Henry Hollembaek, M.D., Professor of Materia Medica and Therapeutics.
Joseph P. Fitler, M.D., Professor of Chemistry and Toxicology.
John Buchanan, M.D., Professor of Theory and Practice of Medicine.
M. N. Miller, M.D., Professor of Anatomy and Physiology.
John Watson, M.D., Professor of Surgery.
John L. Shoemaker, Professor of Medical Jurisprudence.
M. N. Miller, M.D., Demonstrator of Anatomy.
Joseph Sites, M.D., Dean of Faculty.

Session of Spring 1865

The Faculty differed from that of 1863 in the following ways: Drs. Mintzer and Rich were no longer listed. Dr. Buchanan became professor of surgery, Dr. Miller professor of anatomy in addition to serving as demonstrator of anatomy, and operative surgery, Dr. W. Clark professor of theory and practice of medicine and pathology, Dr. Watson's title became professor of military surgery, Dr. E. D. Farr became professor of physiology and institutes of medicine, and Robert Burns, M.D. prosector of anatomy.

Sessions of Winter–Spring, 1865–1866

Thomas G. Chase, M.D., Emeritus Professor of Chemistry.
Joseph Sites, M.D., Dean and Professor of Obstetrics and Diseases of Women and Children.
Henry Hollembaek, M.D., Professor of Materia Medica and Therapeutics.
Joseph P. Fitler, M.D., Professor of Chemistry and Toxicology.
John Buchanan, M.D., Professor of Surgery and Institutes of Medicine.
W. Clark, M.D., Professor of Theory and Practice of Medicine and Pathology.
E. Down, M.D., Professor of Anatomy and Operative Surgery.
John Watson, M.D., Professor of Military and Practical Surgery.
Emil, Querner, M.D., Professor of Physiology and Microscopical Anatomy.
Robert Hamilton, M.D., Professor of Medical Jurisprudence and Hygiene.
E. Down, M.D., Demonstrator of Anatomy.

Session of Spring 1866

Dr. Watson, formerly professor of military surgery, was no longer on the Faculty. Otherwise the Faculty remained the same as that of 1865.

Session of Spring 1867

The Faculty was the same as that of 1865–66, with these exceptions: Dr. Buchanan's title was professor of surgery, Dr. Watson had left in 1866, as noted above, Dr. Hamilton now left, and Dr. George H. Day became professor of the institutes of medicine, Dr. George A. Bagley professor of pathological and surgical anatomy, and Dr. P. W. Heron prosector of anatomy and surgery.

Session of 1867–68

Same as Spring, 1867, except: Drs. Day and Bagley left, and Drs. Lewis A. Hall and B. R. Phillips were added, in Institutes of Medicine and Jurisprudence respectively.

Sessions of 1868–69 (faculty originally announced)

The following changes in the 1865 Faculty are to be noted. As already stated, Drs. Watson and Hamilton had left. Dr. Querner's title became professor of physiology. Drs. Lewis A. Hall, and A. Rittenhouse, became respectively professors of diseases of the nervous system and special pathology and diagnosis, while Drs. J. Cochran and L. D. McMichael became respectively, demonstrators of anatomy and surgical anatomy and J. V. Lewis, L.L.D. lecturer on jurisprudence. Dr. Bagley left.

Session of 1868–69 (Faculty as actually constituted)

Drs. Sites, Hollembaek, Buchanan, Clark, Down, McMichael, Rittenhouse, Querner and Cochran, and in addition, Drs. W. W. Barde

(chemistry and toxicology), J. Isaacs (ophthalmic and oral surgery), William H. Reynolds (operative surgery) and S. B. Merkel (curator and pathologist). Dr. Down's title became "professor of descriptive, comparative and surgical anatomy", Dr. McMichael "professor of physiology and microscopic anatomy" Dr. Rittenhouse "professor of psychological medicine and jurisprudence", Dr. Querner "professor of the diseases of the nervous system".

Session of Spring 1869

Drs. Sites (obstetrics and diseases of women and children), Hollembaek (materia medica and pharmacy), Fitler (chemistry), James Reed (surgery) Down (anatomy), Rittenhouse (practice of medicine) and Querner (physiology).

Session of 1869–70

Drs. Sites, Hollembaek, Buchanan, Down, Rittenhouse, W. H. C. Smith, (operative surgery), Samuel H. B. Bloom, (chemistry), Isaacs, (eye and ear), Cochran, Samuel Roberts, (botany and jurisprudence), A. B. Westcott (physiology and hygiene).

Session of 1870–71

The following changes in the 1869–70 are to be noted: Drs. Rittenhouse, Smith, Bloom, Roberts, and Westcott left. Drs. William Young (practice of medicine and gynecology), J. D. Hylton (chemistry and toxicology), N. Bedortha (hygiene), R. H. De Beust (physiology), George Hutchings (diseases of the throat), A. P. Bissell, (diseases of the skin), A. J. Bassett (mechanical and operative dentistry) and Brodway (prosector of surgery) were added.

Sessions of 1871–72

Joseph Sites, M.D., Professor of Midwifery and Diseases of Women and Children.

Henry Hollembaek, M.D., Professor of Materia Medica and Therapeutics.

John Buchanan, M.D., Professor of Surgery.

Ed. Down, M.D., Professor of Surgical Anatomy and Operative Surgery.

H. C. Stickney, M.D., M.A., Professor of Anatomy.

William Clark, M.D., LL.D., Professor of Practice of Medicine.

J. D. Hylton, M.D., Professor of Chemistry and Toxicology.

J. Isaacs, M.D., Professor of Aural and Ophthalmic Surgery.

N. Bedortha, M.D., Professor of Hygiene.

A. P. Bissell, M.D., Professor of Physiology.

George H. Hutchings, M.D., LL.D., Professor of Diseases of the Throat and Laryngoscopy.

Matthew Hale Smith, M.D., LL.D., Professor of Medical Jurisprudence.

Wm. H. Bowlsby, M.D., Professor of Gynaecology.

R. H. De Beust, M.D., Professor of Descriptive and Comparative Anatomy.

R. McLellan, M.D., Professor of Diseases of the Skin and Venereal Diseases.

R. H. De Beust, M.D., Demonstrator of Anatomy.

James Hill, M.D., D.D.S., Professor of Mechanical and Operative Dentistry.

Drs. Isaacs, Bedortha, Hutchings, Smith, Bowlsby, Hill, De Beust and McClellan held the rank of "auxiliary professor."

Session of 1872–73 (Eclectic)

Drs. Sites, R. A. Simpson (materia medica and therapeutics), Buchanan, Clark (pathology), John Thompson (chemistry and medical jurisprudence), Stickney, E. D. Davis (clinical—nerves), S. H. Bland, (assistant demonstrator).

Session of 1872–73 (American University)

Hutchings, Bowlsby, Thompson, Bissell, W. H. Myers, De Beust, R. McLellan, Alford, Buchanan and Thomas Hutchinson.

Sessions of 1873–74

William Clark, M.D., LL.D., Professor of Practice of Medicine and Pathology.

Joseph S. Longshore, M.D., Professor of Midwifery and Diseases of Women and Children.

John Buchanan, M.D., Professor of Surgery and Institutes of Medicine.
Harvy C. Stickney, M.D., Professor of Anatomy and Physiology.
James Cochran, M.D., Professor of Chemistry and Toxicology.
Robert A. Simpson, M.D., Professor of Materia Medica and Therapeutics.
L. A. Alford, M.D., LL.D., Professor of Anthropology.
George H. Hutchings, M.D., Professor of Laryngoscopy, Nasal, and Throat Diseases.
D. M. Caldwell, M.D., Professor of Psychological Medicine.
William H. Bowlsby, M.D., Professor of Gynaecology.
E. Querner, M.D., Professor of Medical Jurisprudence.
William Hutchinson, M.D., D.D.S., Professor of Operative and Mechanical Dentistry.
H. C. Stickney, M.D., Demonstrator of Anatomy.

Session of 1874–75 (A.) Eclectic Medical College of Pennsylvania, as originally announced

W. L. Aitken, M.D., LL.D., Professor of Practice of Medicine and Pathology.
Robert L. Burns, M.D., Professor of Midwifery and Diseases of Women and Children.
John Buchanan, M.D., Dean, and Professor of Surgery and Institutes of Medicine.
Harry C. Stickney, M.D., Professor of Anatomy and Physiology.
Carl Van Rensselaer, M.D., Professor of Chemistry and Toxicology.
Robert A. Simpson, M.D., Professor of Materia Medica and Therapeutics.
L. A. Alford, M.D., LL.D., Professor of Anthropology.
C. Winfield Scott, Jr., M.D., Professor of Nervous Diseases.
George H. Hutchings, M.D., Professor of Lyrngoscopy, Nasal and Throat Diseases.
D. M. Caldwell, M.D., Professor of Physiological Medicine.
William H. Bowlsby, M.D., Professor of Gynecology.
E. Querner, M.D., Professor of Medical Jurisprudence.
William Hutchinson, M.D., D.D.S., Professor of Operative and Mechanical Dentistry.
H. C. Stickney, M.D., Demonstrator of Anatomy.
(An Announcement for Fall, 1874, stated that the Faculty included Professors Walworth, Abel, Roth, Diller, Parsons and Buchanan)

Session of 1874–75, (B.) American University of Philadelphia—Medical Department of the Eclectic Medical College of Pennsylvania)

(The Winter Session opened on Monday, October 5, 1874; the Summer Session, first Monday of April, 1875.)
James Cochran, A.M., M.D., Professor of Anatomy.
John Thompson, M.D., Professor of Chemistry.
J. K. Bowers, M.D., Professor of the Institutes of Medicine.
D. Bennett, M.D., Professor of Surgery.
J. Buchanan, M.D., Professor of the Practice of Medicine.
R. J. Parsons, M.D., Professor of Midwifery.
A. Morton, M.D., Professor of Materia Medica.
— Harbison, LL.D., Professor of Medical Jurisprudence.
— Young, M.D., Professor of Ophthalmic and Aural Surgery.

Session of 1875–76

Drs. M. Beshoar (medicine), J. C. Walworth (medicine), David Diller (midwifery), Buchanan, De Beust, Cochran, Able, T. W. Woodworth (nervous diseases), H. T. Bond (laryngoscopy), D. M. Caldwell (physiological medicine), Bissell, Querner, M. V. Chapman (mechanical and operative dentistry), and J. J. Siggins (demonstrator of anatomy).

Session of 1876–77

Same as for 1877–78, except that Drs. Cochran, R. A. Simpson, Caldwell and J. H. Brown were professors of anatomy, materia medica and pharmacy, physiological medicine and hygiene, and curator—pathologist respectively, instead

of Drs. Waters and Parmiter, with corresponding changes in assignments for some of the other professors.

Session of Fall–Winter 1877–78 (American University of Philadelphia)

R. J. Parsons, M.D., Emeritus Professor of Obstetrics.
M. Beshoar, M.D., LL.D., Emeritus Professor of Practice of Medicine.
Charles G. Polk, M.D., PH.D., Professor of Surgery, Theoretical and Practical.
David Diller, M.D., M.A., Professor of Midwifery and Diseases of Women and Children.
John Buchanan, M.D., Professor of Practice of Medicine and Pathology.
Robert De Beust, M.D., M.A., Professor of Anatomy.
John Thompson, M.D., Professor of Chemistry and Toxicology.
E. C. Waters, M.D., Professor of Materia Medica and Pharmacy.
Robert De Beust, M.D., Professor of Physiology and Microscopic Anatomy.
W. F. Woodworth, M.D., LL.D., Professor of Gynaecology and Jurisprudence.
Philip A. Bissell, M.D., PH.D. Professor of Operative Surgery.
G. C. Parmiter, M.D., D.C.L., Professor of Physiological Medicine and Hygiene.
M. V. Chapman, M.D., D.D.S., Professor of Mechanical and Operative Dentistry.
Professors E. Querner, M.D., J. J. Siggins, M.D., Lecturers on Botany.
J. J. Siggins, M.D., Demonstrator of Anatomy and Practice of Surgery.
Levy Barrett, Curator and Pathologist.

Session of 1878 (beginning January 3)

(American University of Philadelphia and Eclectic Medical College of Pennsylvania)

Alexis E. E. Falken, M.D., Professor of Surgery, Theoretical and Practical.
David Diller, A.M., M.D., Professor of Midwifery and Diseases of Women and Children.
John Buchanan, M.D., Professor of Practice of Medicine and Pathology and Dean.
Robert Hare De Beust, M.D., Professor of Anatomy.
John Thompson, M.D., Professor of Chemistry and Toxicology.
F. C. Waters, M.D., Professor of Materia Medica and Pharmacy.
A. Davis, M.D., Professor of Physiology and Microscopic Anatomy.
G. C. Parmiter, M.D., D.C.L., Professor of Gynaecology and Jurisprudence.
J. J. Siggins, M.D., Demonstrator of Anatomy and Practice of Surgery.

Sessions of 1878–79 (American University of Philadelphia)

David Diller, M.D., Emeritus Professor of Midwifery and Diseases of Women and Children.
J. S. Stevens, M.D., Professor of Midwifery and Diseases of Women and Children.
T. H. Cooper, M.D., Professor of Surgery, Theoretical and Operative.
John J. Fullmer, M.D., Professor of Materia Medica and Therapeutics.
Robert Hare De Beust, M.D., Professor of Anatomy, Descriptive and Surgical.
F. C. Waters, M.D., Professor of Institutes of Medicine.
William De Beust, PH.D., Professor of Chemistry.
G. C. Parmiter, M.D., D.C.L., Professor of Nervous Diseases.
John Buchanan, M.D., Professor of Theory and Practice of Medicine and Pathology and he is also the Dean.
Emil Querner, M.D., Professor of Electricity and Jurisprudence.
John G. Burchell, M.D., Professor of Gynaecology.
L. W. K. Tracy, M.D., Professor of Hygiene.
Alexander Rohrman, D.D.S., Professor of Mechanical Dentistry.
George Buchanan, D.D.S., Professor of Operative Dentistry.
Edgar Hollace, D.D.S., Professor of Dental Science and Institutes of Dentistry.

Dr. De Beust and Assistants, Demonstrators of Anatomy.

Sessions of 1879–80 (American University of Philadelphia)

William De Beust, PH.D., M.D., Professor of Chemistry and Toxicology.

J. S. Stevens, M.D., Professor of Midwifery and Diseases of Women and Children.

C. H. Kehnroth, M.D., Professor of Surgery and Institutes of Medicine.

John Buchanan, M.D., Professor of Practice of Medicine and Pathology and Dean.

Robert Hare De Beust, M.D., Professor of Anatomy and Physiology.

John J. Fullmer, PH.D., M.D., Professor of Materia Medica and Therapeutics.

David Diller, M.D., Professor of Gynaecology.

Emil Querner, M.D., Professor of Electricity and Jurisprudence.

George C. Parmiter, M.D., D.C.L., Professor of Diseases of Mind and Nervous System.

L. E. F. Tobold, M.D., D.C.L., Professor of Pharmacy and Botany.

George Buchanan, D.D.S., Professor of Operative Dentistry.

R. J. De Miraulyok, M.D., D.D.S., Professor of Mechanical Dentistry.

Edgar G. Hollace, D.D.S., Professor of Dental Science.

P. A. Bissell, M.D., Professor of Eye and Ear.

R. A. Simpson, M.D., Professor of Dermatology.

T. W. K. Tracy, M.D., Professor of Pathology and Diagnosis.

John G. Burchell, M.D., Professor of Clinical Medicine.

Drs. De Beust, Kehnroth and Assistants, Professors of Practical Anatomy and Operative Surgery.

III. (B) ALPHABETIZED LIST OF MEMBERS OF THE FACULTY

(For Faculty grouped by year, see previous pages)

Abel, J. W., M.D., 1874–76
Aitken, W. L., M.D., LL.D., 1874–75
Alford, L. A., M.D., LLD., 1872–75
Appleton, R. W., M.D., 1859–60
Bagley, George A., M.D., 1867
Barden, W. W., M.D., 1868–69
Barrett, Levy 1877–78
Bassett, A. J., D.D.S., 1870–71
Bedortha, N., M.D., 1870–72
Bennett, D., M.D., 1874–75
Beshoar, M., M.D., LL.D., 1877–78
Bissell, Philip A., M.D., 1870–79
Bland, S. H., M.D., 1872–73
Bloom, Samuel H., M.D., 1869–70
Bohannan, J. G., M.D., 1859
Bond, H. T., M.D., 1875–76
Bowers, J. K., M.D., 1874–75
Bowlsby, William H., M.D., 1871–75
Brackett, Philip A., M.D., 1853–54
Brodway, ——, M.D., 1870
Buchanan, George, D.D.S., 1878–80
Brown, J. H., M.D., 1876
Buchanan, John, M.D., 1863–80
Burchell, John G., M.D., 1878–80
Burns, Robert, M.D., 1865
Buzzell, James, M.D., 1855–57
Caldwell, D. M., M.D., 1873–77
Calkins, Marshall, M.D., 1854–60
Chapman, M. V., M.D., D.D.S., 1875–78
Chase, Thomas G., M.D., 1853–69
Clark, William, M.D., 1865–74
Cochran, J., M.D., 1868, 1873–77
Cooke, Thomas, M.D., 1851–55
Cooper, T. H., M.D., 1878–79
Davis, A., M.D., 1878
Davis, E. D., M.D., 1872–73
Day, George H., M.D., 1867
De Beust, Robert Hare, M.A., M.D., 1870–72, 1877–80
De Beust, William, PH.D., 1878–80
De Miraulyok, R. J., M.D., 1879–80
Diller, David, M.A., M.D., 1875–80
Down, Edward, M.D., 1865–72 (?)
Falken, Alexis, E. E., M.D., 1878
Farr, E. D., M.D., 1865
Fitler, Joseph P., M.D., 1863–69
Fondey, John, M.D., 1853–57 (?)
Fullmer, John J., M.D., 1878–80
Gates, Thomas G., M.D., 1855–56
Hall, Lewis A., M.D., 1867–69
Hamilton, Robert, M.D., 1865–67

Harbison, ——, LL.D., 1874–75
Heron, P. W., M.D., 1867
Hill, James, M.D., D.D.S., 1871
Hollace, Edgar G., D.D.S., 1878–80
Holland, Joseph, M.D., 1857–58
Hollembaek, Henry, M.D., 1851–72 (?)
Hutchings, George H., M.D., LL.D., 1870–75
Hutchinson, Thomas, M.D., D.D.S., 1872–75
Hylton, J. D., M.D., 1870–72
Isaacs, Judah, M.D., 1868–72
Kenroth, C. H., M.D., 1879–80
Lewis, J. V., LL.D., 1868
Longshore, Joseph S., M.D., 1873–74
McClintock, James, M.D., 1860
McDowell, Hamilton, M.D., 1853
McLellan, R., M.D., 1871–72
McMicheal, L. D., M.D., 1868–69
Merkel, S. B., M.D., 1868–69
Miller, M. N., M.D., 1863–65
Mintzer, S. J. W., M.D., 1851–64
Morton, A., M.D., 1874–75
Myers, W. H., M.D., 1872–73
Paine, William, M.D., 1855–60
Parmiter, George C., M.D., D.C.L., 1877–80
Parsons, R. J., M.D., 1874–78
Phillips, B. R., 1867–68
Polk, Charles G., M.D., PH.D., 1877–78
Potter, Stephen H., M.D., 1851–52
Querner, Enil, M.D., 1865–80
Reed, James, M.D., 1869
Reynolds, William H., M.D., 1868–69
Rich, John G., M.D., 1863–64
Rittenhouse, A., M.D., 1868–70
Roberts, Samuel, M.D., 1869–70
Rohrman, Alexander, D.D.S., 1878–79
Roth, ——, 1874–75
Scott, C. Winfield, Jr., M.D., 1874–75
Shoemaker, John L., M.D., 1863–65
Siggins, J. J., M.D., 1875–78
Simpson, Robert, A., M.D., 1879–80
Sites, Joseph, M.D., 1851–72 (?)
Smith, Matthew Hale, M.D., LL.D., 1871–72
Smith, W. H. C., M.D., 1869–70
Stevens, J. S., M.D., 1878–80
Stickney, Harry C., M.A., M.D., 1871–75
Thomas, J. H., M.D.. 1859–60
Thompson, John, M.D., 1872–78
Tobold, L. E. F., M.D., 1879–80
Tracy, L. W. K., M.D., 1878–80
Van Rensselaer, Carl, M.D., 1874–75
Walworth, J. C., M.D., 1874–76
Waters, F. C., M.D., 1877–79
Watson, John, M.D., 1863–66
Westcott, A. B., M.D., 1869–70
Woodworth, W. F., M.D., LL.D., 1875–78
Young, William, M.D., 1870, 1874–75

IV. TEXTBOOKS USED

Anatomy ond Physiology: Morton's Human Anatomy; Quain's Anatomical Plates; Carpenter's or Dunglison's Physiology; Kirk's, Wilson's and Horner's texts (1857), Gray's added in (1864), Dalton's (added in 1868), Cochran's (1869), Flint (1877).

Auscultation and Percussion: Gerhard, (abandoned by 1859), Newton and Calkins.

Chemistry: (No books on chemistry are mentioned, until the 1855 Announcement). Fownes, Turner, Silliman, Fitler (1864), Brandt and Taylor (added in 1868, and all others abandoned). Fownes (restored in 1872).

Dictionary (1869) Thomas.

Materia Medica and Therapeutics: Kost's Materia Medica and Therapeutics; Howard's Botanic Practice; Eclectic Dispensatory, Beach (added in 1857). U.S. Dispensatory; Good's Flora (abandoned in 1857); Hollembaek (added in 1864) Buchanan's New Remedies, (added in 1868), King's Dispensatory (added in 1874). Eclectic Pharmacopoeia (1877), Buchanan and Siggins' Dispensatory and Pharmacopoeia of North America and Great Britain (1878).

Medical Jurisprudence: Beck.

Obstetrics and Diseases of Women and Children: Beach's Midwifery, Howard, Ramsbotham, Dewees, King (added in 1857) Scudder (added in 1859), Sites (1864) Buchanan on children (by 1867), Buchanan's Midwifery (1877).

Principles and Practice of Surgery: Hill's Eclectic Surgery, Druit's, Beach's, Mott's, Velpeau and Miller's (the three last-named abandoned in 1857) Syme (added in 1859), Miller, Buchanan (both added by 1864).

Theory and Practice of Medicine: Beach (large work). Encyclopoedia of Practical Medicine, Howard's, Wood and Watson's Practice. In 1857 the following were added: Jones and Morrow, Newton and Calkins, Powell and Paine. (The "Encyclopoedia" was abandoned). Fondey on Tubercular Diseases (1855); William's Chomel, King, Scudder (both added by 1864), Buchanan on Venereal Diseases (by 1867), Buchanan's American Practice (1869), Beale on Germs (1879).

Textbooks in most constant use in the last ten years of the life of the College: Gray's Anatomy: Flint's or Dalton's Physiology; Brandt and Taylor or Fownes Chemistry; Hollembaek's Materia Medica; Sites and Buchanan's Obstetrics and Diseases of Women and Children; Buchanan's American Practice; Buchanan's Surgery; Buchanan's New Remedies; Cochran's Manual of Anatomy; Thomas' Dictionary; Eclectic Pharmacopoeia.

V. LIST OF MATRICULATES AND GRADUATES OF THE ECLECTIC MEDICAL COLLEGE OF PENNSYLVANIA-AMERICAN UNIVERSITY OF PHILADELPHIA

(Until the year 1872 the name of the College was simply "The Eclectic Medical College of Pennsylvania," and holders of the degree were graduates of that institution, and not of the American University of Philadelphia.) The letters M.D. indicate that the degree of Doctor of Medicine was conferred by the Eclectic Medical College of Pennsylvania-American University of Philadelphia in the year stated immediately following the degree. The absence of M.D. after a name means that available records show only that the person named was a matriculate in the year given. For graduates no data were available for the years: 1855, 6, 7, 9, 61, 2, 3, 76 and 80. (Only a small number of names of matriculates who did not graduate was found.) If the M.D. is enclosed in parentheses, i.e. (M.D.), neither the date nor the school which conferred the degree is evident from the university records alone. Whenever it was possible to do so, the name of the preceptor and thesis were given, but it was not found possible to do this for a great many graduates. The indented data beneath the graduate's name are place of residence, preceptor's name, and title of thesis, in that order. Honorary degrees are so noted.

Most of the announcements from which the data for this list are drawn have been assembled by the Library of the College of Physicians of Philadelphia and the National Library of Medicine. The libraries of the Historical Society of Pennsylvania, the Library Company of Philadelphia, the State Library, in Harrisburg, and the Library of the New York Academy of Medicine also have holdings on this medical school.

Abel, Jacob W., M.D., '66
Philadelphia
Abrams, S. R., M.D., '70
New York
Hernia
Acker, Eli, M.D., '70
Plattsville, Connecticut
Action of Drugs
Adaire, G. T., M.D., '69
Adams, Eli Q., M.D., '68
Adams, Henry O., M.D., '58
Massachusetts
Adams, Henry, M.D., '64
Canada West
Adams, H., Honorary M.D., '67
Canada West
Adams, Honorable W., (LL.D.), M.D., '74
Oregon
Dr. Stickney
Rheumatism
Adams, W. L., Honorary M.D., '74
Oregon
Adamson, J. B., M.D., '68
Airey, Thomas, M.D., '64
England
Albright, Abram, M.D., '65
Philadelphia
Alcott, Ralph W., M.D., '65
Philadelphia
Aldrich, E. W., M.D., '72
California
Dr. Davis
Diagnosis
Aldrick, E. W., M.D., '74
New Hampshire
Dr. Barrett
Diabetes

Alexander, James, M.D., '77
Michigan
Dr. Brown
Ophthalmia

Allen, C. B., M.D., '71
Newark, New Jersey
Jurisprudence

Allen, Henry, M.D., '73
Ohio
Dr. Schopen
Water

Allen, J. B., M.D., '73
Connecticut
Dr. Booth
Inflammation

Allen, Warren, M.D., '78
New York
Dr. Hayne
Paralysis

Amos, H. C., M.D., '77
Tennessee
Dr. Sawyer
Bronchitis

Anderson, L. L., M.D., '70
Georgia
Aphthae

Anderson, Samuel, M.D., '66
Maine

Andrews, Edwin E., '60
New York

Appley, J. D., M.D., '72
New York
Dr. McComas
Small-pox

Armstrong, William, M.D., '63

Armstrong, William, M.D., '78
Pennsylvania
Dr. Brown
Electricity

Arnold, T. T., M.D., '77
New York
Dr. Jessup
Jaundice

Ashburn, Smith, M.D., '69

Asire, J. L., M.D., '69

Atkinson, W. J., M.D., '72
Massachusetts
Dr. Davis
Laryngitis

Atsinson, Samuel, M.D., '52
Philadelphia

Austin, W. A., M.D., '66
Michigan

Axt, Frederick, '60
Pennsylvania

Ayer, A. D., M.D., '77
Rhode Island
Dr. Gallup
Diphtheria

Ayre, J., M.D., '71
Philadelphia
Dysmenorrhoea

Ayres, Daniel, M.D., '73
Dr. Ellis
Cataract

Ayres, Ezra J., M.D., '71
Amboy, Michigan
Syphilis

Babbit, W. J., M.D., '70
New York
Chronic Inflammation of Lungs

Babcock, John L., M.D., '69

Backus, B. P., M.D., '66
New York

Bagge, Samuel Gordon, '60
Pennsylvania

Bagley, George A., M.D., '64
Vermont

Bagley, G. K., Honorary M.D., '64
Vermont

Bagley, H. A. C., M.D., '74
Georgia
Dr. Bagley
Consumption

Bailey, W. E., M.D., '79
Vermont
Dr. Templeton
Peritonitis

Baker, Charles A., M.D., '65
Philadelphia

Baker, D. S., M.D., '78
New York
Dr. Parmiter
Rheumatism

Balcome, Edwin, M.D., '66
Massachusetts

Balsbaugh, Christian H., '52
Hummelstown, Pennsylvania
Dr. H. Hollembaek

Bancroft, D. S., M.D., '67
Massachusetts

Bannister, F., M.D., '70
Pennsylvania
Gelseminum

Bannister, R., M.D., '70
Pennsylvania
Infantile Paralysis

Banton, J. F., M.D., '77
New York
Dr. Farles
Intermittent Fever

Barber, H. A., M.D., '70
Toledo, Ohio
Hemorrhagic Diathesis
Barden, William W., M.D., '67
New York
Barner, George, M.D., '74
New York
Dr. Patrick
Uroscopy
Barnes, Enos, M.D., '70
Kilbuck, Ohio
Intermittent Fever
Barnes, G. B., M.D., '72
New York
Dr. Noble
Dyspepsia
Barnes, William M.D., '68
Barnum, George, M.D., '65
New York
Barret, M. E., M.D., '75
Pennsylvania
Dr. Craig
Midwifery
Barrett, A. G., M.D., '65
Philadelphia
Barrett, W. E. M., M.D., '73
Massachusetts
Dr. Hutchings
Genito-Urinary Disease
Barrows, S., M.D., '66
Michigan
Barstow, George A., M.D., '79
New York
Dr. Foot
Diphtheria
Batchelor, W. J., M.D., '70
St. Louis, Missouri
Scurvy
Bates, C. S., M.D., '72
Pennsylvania
Professor Sites
Disease
Bates, H. O., M.D., '69
Bayard, J., M.D., '74
Delaware
Dr. Cox
Malaria
Bayne, W. F., M.D., '70
Illinois
Cerebro-spinal Disease
Baynes, J. M., M.D., '65
Pennsylvania
Beale, Edmond, M.D., '69
Bean, E. D., M.D., '73
Ohio
Dr. Gunn
Syphilis
Bean, S., M.D., '64
Canada West
Beans, James M., M.D., '69
Beasley, John Q., M.D., '79
Pennsylvania
Dr. Buchanan
Placenta Previa
Bechtel, Davis, M.D., '73
Pennsylvania
Dr. Rizer
Erpsipelas
Bedortha, B. N., M.D., '70
New York
Tubercular Meningitis
Belden, Calvin, '60
Ohio
Bell, D. D., M.D., '73
Pennsylvania
Dr. Taylor
Strictures
Bell, S. B., M.D., '69
Bell, William, M.D., '67
New York
Bennett, A. G., M.D., '74
Ohio
Dr. Bennett
Laryngitis
Bennett, G. A., M.D., '77
Georgia
Dr. Forbes
Paralysis
Benton, George S., M.D., '71
Brantford, Canada
Hygiene
Bering, C. C., M.D., '65
Massachusetts
Berry, H. J., M.D., '79
New Hampshire
Dr. De Beust
Typhoid Fever
Beshoar, M., M.D., '73
Colorado
Dr. Goodwin
Climate for Consumptives
Birch, A. W., M.D., '70
Ohio
Hip Disease
Bishoff, C. N. (W.), M.D., '72
Pennsylvania
Dr. Simpson
Angina Pectoris
Bishop, J. H., M.D., '77
Pennsylvania
Dr. Betts
Cholera Infantum
Bechtle, J. H., M.D., '65
Pennsylvania

Blackwood, James C., M.D., '72
(Ohio) (Missouri)
Dr. Gray
Yellow Fever
Blake, Thomas F., '60
Pennsylvania
Blake, W. H., M.D., '70
Pennsylvania
Mind over Matter
Blanchard, H. H., M.D., '73
New York
Dr. Clark
Reflex Action
Bland, T. T., M.D., '72
Pennsylvania
Dr. Buchanan
Uterine Disease
Blann, S. W., M.D., '78
New York
Dr. Donalson
Ophthalmia
Bledsoe, Harry, M.D., '72
Georgia
Dr. Warren
Pleurisy
Bogue, Charles V., M.D., '79
Vermont
Dr. Templeton
Tuberculosis
Bogue, Herbert E., M.D., '79
Vermont
Dr. Templeton
Hepatitis
Bohannan, John G., M.D., '58
Virginia
Bonar, Benedict, M.D., '66
Vermont
Bond, H. T., M.D., '74
Pennsylvania
Dr. Bond
Inhalation
Bostwick, C. E., M.D., '70
Pittsburgh, Pennsylvania
Amaurosis
Boulster, Edwin, M.D., '75
Rhode Island
Dr. Jones
Ulceration
Bowen, Albert H., M.D., '68
Bowen, A. H., Jr., M.D., '78
New York
Dr. Crosby
Pneumonia
Bowerman, S. B., M.D., '66
Pennsylvania
Bowers, A. H., M.D., '78
Pennsylvania
Dr. Gray
Remedies
Bowers, J. K., M.D., '74
Virginia
Dr. Star
Dyspepsia
Bowie, John, Honorary M.D., '70
Bowles, Harvey Edward, '60
Canada West
Bowlesby, H. H., M.D., '68
Bowlsby, W. H., Honorary M.D., '70
Boynton, C. S., M.D., '68
Bradsworth, J. H., M.D., '75
England
Dr. Sexton
Fever
Bradway, J. H., M.D., '70
Pennsylvania
Heat
Brady, Johnston, M.D., '70
Canada
Lobelia
Branstrup, W. T., Honorary M.D., '64
Canada West
Brantley, C., M.D., '66
New York
Brawn, W. H., M.D., '69
Brenner, M. P., M.D., '65
Connecticut
Brickner, M. F., M.D., '79
Connecticut
Dr. Buchanan
Chorea
Briggs, T., M.D., '75
New Hampshire
Dr. Carble
Nephritis
Bringhurst, Isaiah, M.D., '70
Pennsylvania
Electricity
Britten, Astley C., '52
Richmond, Virginia
Dr. S. J. W. Mintzer
Broadwell, A. J., M.D., '69
Brooke, Charles, M.D., '66
New Hampshire
Brooke, Firmen C., M.D., '66
Pennsylvania
Brooks, James B., M.D., '79
Pennsylvania
Dr. Titus
Dysmenorrhaea
Brooks, Samuel A., M.D., '79
New York
Dr. Smith
Hydrocele

Brothers, C. E., M.D., '74
Ohio
Dr. Walker
Marasmus
Broughton, L. D., M.D., '63
Brown, D. M., M.D., '70
Kansas
Scutellarin
Brown, F. C., M.D., '73
New York
Dr. Brown
Tumors
Brown, G. W., M.D., '68
Brown, John H., M.D., '69
Brown, John M., Honorary M.D., '79
Washington, D. C.
Brown, John '60
Ohio
Brown, J., Honorary M.D., '69
Canada
Brownson, M. S., M.D., '70
New York
Typhoid Fever
Brownson, S. S., M.D., '71
Amboy, Michigan
Diseases of the Heart
Bruce, John M., M.D., '70
Pittsburgh, Pennsylvania
Carbuncle
Brunswick, George, M.D., '74
England
Dr. Humphries
Lobelia
Bryan, Adam, M.D., '69
Bryan, James, Honorary M.D., '74
New York
Bryant, J. R., M.D., '78
New York
Dr. Newton
Mind and Matter
Buch, John L., M.D., '75
Pennsylvania
Dr. Buch
Hydrangea
Buchanan, James Jr., '60
Pennsylvania
Buchanan, John, M.D., '58
Philadelphia
Buchanan, Joseph, M.D., '74
Texas
Dr. Huston
Skin Disease
Buck, A. L., M.D., '67
Pennsylvania
Budlong, William Hague, '60
Rhode Island
Bulick, T. M., M.D., '72
Pennsylvania
Dr. Bulick
Ovarian Disease
Bu(l)kley, Richard C., M.D., '72
New York
Dr. Bowlsby
Angina Pectoris
Bulmer, Thomas H., M.D., '68
Burchell, John T., M.D., '73
Pennsylvania
Dr. Merriman
Tonics
Burdick, J. T., (M.D.), Honorary M.D., '64
Brooklyn, New York
Burgner, Samuel H., '60
Ohio
Burner, H. R., M.D., '78
Ohio
Bright's Disease
Burnes, Mrs. Julia A., M.D., '78
Ohio
Dr. Schnider
Diseases of Women
Burns, Robert, M.D., '65
Canada West
Burr, Frank L., M.D., '71
Middletown, Connecticut
Rheumatism
Burt, Andrew, M.D., '74
Pennsylvania
Dr. Crease
Phlegmasia
Burt, J. A., M.D., '65
New York
Burton, H. B. H., M.D., '69
Bushnell, George W., M.D., '58
Ohio
Butler, Lafayette, M.D., '69
Butler, Richard C., M.D., '67
Canada West
Butman, George F., Honorary M.D., '79
Rhode Island
Butterfield, Thomas, M.D., '71
Dewsbury, England
Hydrocele
Buzzell, R. D., M.D., '74
Maine
Dr. Lewis
Deformities

Calder, George, M.D., '70
Canada
Apoplexy
Calkins, Frederick W., M.D., '58
Massachusetts
Callahan, P. J., M.D., '60
Ohio

Calver, G. W. H., '60
Pennsylvania
Cambell, R. M., M.D., '74
Pennsylvania
Dr. Gamble
Diphtheria
Cameron, D., Honorary M.D., '74
Delaware
Camp, E. E., M.D., '78
Georgia
Dr. Salter
Gelseminum
Camp, J., M.D., '74
Pennsylvania
Dr. Hope
Scarlatina
Campbell, James B., M.D., '68
Campbell, James, M.D., '69
Campbell, James, M.D., '77
Dr. Chandler
White Softening
Campbell, T., M.D., '74
New Jersey
Dr. Sweet
Tetanus
Candless, J. M. '60
Pennsylvania
Cannon, James, M.D., '68
Cannon, William, M.D., '75
Canada
Dr. Paterson
Dyspepsia
Carman, George P., M.D., '75
Illinois
Dr. Clark
Angina Pectoris
Carpenter, Charles, M.D., '79
Massachusetts
Dr. Farmer
Apoplexy
Carpenter, Hosea, M.D., '70
Pennsylvania
Pericarditis
Carroll, Albert, M.D., '65
Massachusetts
Carsons, (M.D.), Honorary M.D., '64
Canada West
Carter, I. H., M.D., '75
Indiana
Dr. Bennington
Measles
Castellana, P. C. Y., M.D., '74
Cuba
Dr. Rubeo
Yellow Fever
Caterson, William C., M.D., '70
Philadelphia
Typhoid Fever
Chamberlain, A., M.D., '67
Connecticut
Chamberlain, George, M.D., '68
Chapman, A. V., M.D., '71
Philadelphia
Ulcers
Chapman, M. V., M.D., '72
Pennsylvania
Dr. Buchanan
Dentition
Charles, Henry, M.D., '66
Pennsylvania
Chellis, Edwin R., M.D., '69
Cheney, John N., M.D., '67
Pennsylvania
Cheney, W. S., M.D., '70
Vermont
Cholera
Chiles, Edward, M.D., '74
Pennsylvania
Dr. Guthrie
Action of Medicines
Chrissman, Henry, M.D., '68
Christ, W. F., Honorary M.D., '74
Pennsylvania
Christine, J. S., '60
Pennsylvania
Christman, Charles H. '52
Philadelphia
Christopher, C. C., M.D., '74
Vermont
Dr. Hacks
Gelsemin
Clark, C. H., M.D., '69
Clark, George, M.D., '77
Canada
Dr. Henderson
Measles
Clark, George G., M.D., '79
Massachusetts
Dr. Derney
Infantile Catarrh
Clark, H. F., M.D., '70
Worcester, Massachusetts
Neuralgia
Clark, James N., M.D., '69
Clark, John, Honorary M.D., '66
Clark, J. G., M.D., '75
Indiana
Dr. Fort
Gastritis
Clark, N. T., M.D., '68
Clark, R. H., (M.D.), Honorary M.D., '64
Canada West

Clark, Stanley G., M.D., '66
Canada West
Clark, Steven, M.D., '66
Vermont
Clark, Thomas '60
Louisiana
Clark, William '60
Massachusetts
Clark, W., (M.D.), Honorary M.D., '64
Canada West
Clegy, James, M.D., '73
Ohio
Faculty
Insanity
Clippenger, H. G., M.D., '72
Pennsylvania
Dr. Andrews
Life Force
Clouse, Thomas J., M.D., '69
Clum, F. D., M.D., '73
New York
Dr. Molaire
Dentition
Coba, Juan Sanchez y, M.D., '77
Cuba
Dr. Siggins
Yellow Fever
Cobb, Charles H., M.D., '74
Massachusetts
Phthisis Pulmonalis
Cochrane, L. R., M.D., '70
Lisbon Centre, New York
Gastric Fever
Coker, P. H., M.D., '74
Pennsylvania
Dr. Buchanan
Fracture
Cole, Edgar, M.D., '73
Pennsylvania
Dr. Henderson
Dress
Cole, William E., M.D., '69
Colerick, Alexander E., M.D., '65
New York
Coles, F. H., M.D., '70
Mullica Hill, New Jersey
Phthisis
Collins, Charles, M.D., '75
New York
Remittent Fever
Collins, L. C., M.D., '70
Reflex Action
Colton, J. W., M.D., '73
New Jersey
Dr. Reid
Burns
Comfort, R. P., M.D., '79
Ohio
Dr. Hembold
Splenitis
Con, Max, M.D., '79
Germany
Dr. Kehnroth
Electricity
Conant, Isaiah, M.D., '65
Massachusetts
Cook, E. H., M.D., '77
New York
Dr. Whitny
Cholera
Cook, Elias N., M.D., '79
Texas
Dr. Tinsley
Cooke, C. B., M.D., '78
Connecticut
Dr. Hinkle
Dyspepsia
Coon, D. R., M.D., '65
Canada West
Cooper, William M., M.D., '54
West Chester, Pennsylvania
Dr. J. W. Cooper
Cope, David, M.D., '73
Mississippi
Dr. Deering
Death
Corel, A. W., M.D., '78
New York
Dr. Force
Rheumatism
Cornish, H. D., M.D., '70
New York
Cellular Growth
Cory, Henry, M.D., '79
New York
Dr. Binchell
Enteritis
Coryell, S. D., M.D., '69
Courseir, J. F., M.D., '70
Kentucky
Syphilis
Covert, D. A., M.D., '73
Ohio
Dr. Rothe
Balanitis
Cowan, Young, (M.D.), Honorary M.D., '64
Canada West
Cowles, James Perkins, '60
New York
Crane, James B., M.D., '70
Pennsylvania
Epilepsy

Crawford, James, M.D., '64
California
Cress, James, '60
Pennsylvania
Crombie, James, M.D., '74
Canada
Dr. Hayden
Chloride of Gold
Cronin, F. M., M.D., '75
Texas
Cerebro-spinal Meningitis
Crosby, J. P., Honorary M.D., '69
England
Crowther, G. H., M.D., '74
England
Dr. Stern
Climate
Crumb, W. R., (M.D.), Honorary M.D., '70
Buffalo, New York
Crumrine, B. F., M.D., '68

Dake, D. S., M.D., '78
New York
Dr. Rush
Consumption
Dalzell, Giver, M.D., '78
Scotland
Dr. Ward
Croton Chloral
Danforth, M. W., M.D., '69
Danter, James F., M.D., '65
Canada West
Darrin, V., M.D., '78
New York
Dr. Parmiter
Magnetism
Davies, David, (M.D.), Honorary M.D., '70
Sheakleyville, Pennsylvania
Davies, G. H., M.D., '79
Massachusetts
Dr. Emerson
Pneumonia
Davies, James, M.D., '77
Maine
Dr. Brown
Yarrow
Davis, David, Honorary M.D., '70
Davis, E. C., M.D., '72
Michigan
Bright's Disease
Davis, E. M., M.D., '79
Pennsylvania
Dr. Waters
Variola
Davis, F. M., M.D., '69
Davis, H. S., M.D., '68
Davis, Isaac, M.D., '70
Little Neck, Long Island, New York
Fractures
Davis, Judson, M.D., '60
Ohio
Davis, J., Honorary M.D., '69
Pennsylvania
Davis, Robert '60
Alabama
Day, G. H., M.D., '66
Maine
Day, James, (M.D.), Honorary M.D., '70
New York
De Beque, W. A., M.D., '72
Connecticut
Dr. Reynolds
Small-pox
De Burkarte, J., M.D., '70
Pennsylvania
Asthma
Defendorf, J. J., M.D., '72
New York
Dropsy
Dehm, William A., M.D., '73
Canada
Dr. Dehm
New Remedies
Dehn, Charles W., M.D., '72
Pennsylvania
Dr. Bechtle
Carditis
Dehn, W. H., M.D., '74
Vermont
Dr. Dehn
Bromine
De Hoff, E. S., M.D., '78
Kentucky
Dr. Swain
Pleurisy
Demme, Pierre, M.D., '64
Montreal, Canada
Derrickson, Jacob, M.D., '52
Wilmington, Delaware
Dr. Joseph Sites
Detiman, F. F., M.D., '77
Rhode Island
Dr. Brinton
Obesity
Dewey, S. T., M.D., '77
Rhode Island
Dr. Connor
Buchu
Dickel, John G., M.D., '70
Pennsylvania
Convulsions
Dickens, Robley, M.D., '69

Dickerman, D. S., M.D., '70
Boston
Sciatica
Dickerson, Jacob Townsend, '60
Delaware
Diller, D., M.D., '64
Pennsylvania
Dimmick, H. J., M.D., '65
New York
Dimock, H. S., M.D., '67
Dingman, James A., M.D., '70
Pictou, Canada
Gelseminum
Doan, E. H., M.D., '72
Pennsylvania
Dr. Betts
Fevers
Dodge, Mrs. E. G., M.D., '78
New York
Typhoid Fever
Dodge, R., M.D., '75
Vermont
Dr. Briggs
Metritis
Dolphin, T. J., M.D., '70
Pennsylvania
Typhus Fever
Donahue, P., M.D., '74
Ohio
Dr. McQuillan
Fever
Donaldson, E. P., M.D., '79
Michigan
Dr. Polk
Scarlet Fever
Donaldson, G. W., M.D., '79
Michigan
Dr. Wordsworth
Chloral Hydrate
Donaldson, Niles J., M.D., '67
Massachusetts
Donaldson, Robert T., M.D., '69
Donaldson, W. J., Honorary M.D., '68
Doran, C. K., '55
Doran, Charles K. '60
Pennsylvania
Dorver, Z. T., M.D., '74
Pennsylvania
Dr. Buchanan
Labor
Doud, F. W., M.D., '79
Ohio
Dr. Kehnroth
Erysipelas
Dougherty, H. D., M.D., '77
Pennsylvania
Dr. Woodworth
Purgatives
Douglass, J. N., M.D., '70
Pennsylvania
Leucorrhoea
Downing, Edward, M.D., '65
Canada West
Draw, Sebastian, M.D., '65
Cuba
Duff, G. M., M.D., '69
Duff, G. T., M.D., '67
Georgia
Duff, R. W., M.D., '69
Duff, William Q., M.D., '69
Duffin, W. H., M.D., '75
Pennsylvania
Dr. Buchanan
Peritonitis
Dumas, C. F., M.D., '66
Louisiana
Duncan, Alexander B., M.D., '68
Durham, J. L., M.D., '75
Georgia
Dr. Durham
Haematuria
Durham, W. H., M.D., '68
Durham, W. R., Honorary M.D., '68

Earl, J. N., M.D., '70
Chapel Hill, North Carolina
Bright's Disease
Eastland, J. S., M.D., '70
Wisconsin
Cholera
Eastman, C. J., M.D., '77
New York
Dr. Polk
Pitcher Plant
Eastman, S. N., M.D., '69
Eaton, E. R., M.D., '70
Massachusetts
Cancer
Eby, Samuel M., M.D., '52
Mt. Joy, Pennsylvania
Ecker, S. Nimrod, M.D., '54
Jacksonville, Pennsylvania
Dr. David Ecker
Edmonds, William, M.D., '78
Florida
Dr. Siggins
Pneumonia
Edson, J. C., M.D., '65
New York
Egar, E. T., M.D., '69
Eggert, George C., M.D., '65
Canada West

Ehle, George E., M.D., '75
Michigan
Dr. Cannon
Biliary Calculi
Eley, A. W., M.D., '69
Ellerson, Ozias, M.D., '71
Glassboro, New Jersey
Diarrhoea
Ellsworth, F. R., M.D., '69
Ellsworth, V. A., M.D., '69
Emerson, Charles W., M.D., '79
Massachusetts
Dr. Buchanan
Vocal Cords
Emerson, C. W., Honorary M.D., '79
Massachusetts
Emerson, H. A., M.D., '79
Massachusetts
Dr. Buchanan
Peritonitis
Emigh, J. C., M.D., '72
Pennsylvania
Dr. Fields
Phthisis
Emmert, F. B., M.D., '79
Maryland
Dr. Jones
Laryngitis
Entrikins, William M. '60
Pennsylvania
Evans, Barak, M.D., '79
Rhode Island
Dr. Butman
Peritonitis
Evans, C. B., M.D., '69
Evans, F., M.D., '75
New York
Dr. Walworth
Ophthalmia
Evans, John (M.) (N.) M.D., '72
Pennsylvania
Dr. Fields
Diseases of the Eye
Evans, J. T., M.D., '69
Evans, Thomas, M.D., '75
New York
Dr. Walworth
Bronchitis
Everly, M. N., M.D., '73
Pennsylvania
Dr. Barker
Cancer
Everson, John W., M.D., '53
Philadelphia
Drs. Cooke and Mintzer
Febris Intermittens

Everts, George S., M.D., '65
New York

Faanders, A. L., M.D., '79
New Hampshire
Dr. De Beust
Gastritis
Fairlamb, George W., M.D., '70
Pennsylvania
Enteritis
Faloon, Matthew, '60
Indiana
Fambro, A. A., M.D., '77
Georgia
Dr. Cole
Pleurisy
Farr, E. D., M.D., '58
New Hampshire
Faulkner, J. M., M.D., '73
Pennsylvania
Faculty
Alcohol
Fearson, Jones, M.D., '64
New Hampshire
Fellows, A. R., M.D., '72
New Hampshire
Dr. Bishop
Digitalis
Fenton, W., M.D., '68
Field, M. M., M.D., '64
Canada West
Finletter, H. H., M.D., '77
Georgia
Dr. Simmons
Chorea
Firth, H. E., Honorary M.D., '66
Fisher, Charles, M.D., '66
Connecticut
Fisher, D. K., M.D., '75
Pennsylvania
Dr. Mathews
Laryngitis
Fisher, Joseph, M.D., '65
Pennsylvania
Fisher, William J., M.D., '79
Maine
Dr. Sears
Hypodermic Injection
Fiske, C. E., JR., M.D., '66
Pennsylvania
Flagg, Andrew, M.D., '69
Flagg, W. A., M.D., '64
Illinois
Flanigan, Henry M., M.D., '75
New Jersey
Dr. Holden
Eupatorin

Fletcher, George M., M.D., '69
Floren, C. W., M.D., '68
Forbes, E. E. L., M.D., '74
Delaware
Dr. Cameron
Hooping Cough
Force, Levi, M.D., '67
New York
Ford, Augustus, M.D., '73
New York
Dr. Frost
Stillingia
Ford, Rufus, M.D., '64
Colorado Territory
Forgus, Wellington '52
Camden, New Jersey
Foster, W. H., M.D., '70
Maine
Infantile Diarrhoea
Foulds, Samuel, M.D., '78
England
Dr. Brown
Diseases of the Brain
Fowler, John M., M.D., '68
Frailigh, W. S., M.D., '75
Canada
Dr. Russel
Fever
Frank, George, M.D., '70
Virginia
Vital Force
Frank, I., M.D., '75
Pennsylvania
Dr. Doak
Amputation
Franks, Baron, M.D., '69
Franks, L. C., M.D., '67
Massachusetts
French, Charles, M.D., '67
Georgia
French, T. S., M.D., '67
Georgia
French, William, M.D., '77
Michigan
Dr. Fisk
Metritis
Frost, H. M., M.D., '67
Pennsylvania
Frost, James, M.D., '73
Missouri
Dr. Hope
Small Pox
Fry, Daniel C., M.D., '70
Drumbo, Canada
Rubeola
Fuchs, F. L., M.D., '79
New York
Dr. Buchanan
Germs
Fuller, L. D., M.D., '67
Connecticut
Fullmer, John J., M.D., '58
Pennsylvania
Fyfe, J. M., M.D., '78
Connecticut
Dr. Buchanan
Lead Poisons

Gahegan, John, M.D., '73
Ohio
Dr. Maythorn
Bronchitis
Gale, H. T., M.D., '75
New York
Dr. Hooker
Cerebritis
Gallup, A. F., M.D., '73
Connecticut
Dr. Buchanan
Notes on Diseased Brain
Gallup, Charles N., M.D., '74
Connecticut
Dr. Gallup
Chronic Diseases
Gallup, J. B., M.D., '70
Scotland, Connecticut
Erysipelas
Gamble, I. A., M.D., '74
Pennsylvania
Dr. Gamble
Hypertrophy of Liver
Gander, Benjamin, M.D., '78
Pennsylvania
Dr. Gray
Pleurisy
Gardner, W. S., M.D., '72
New Jersey
Dr. Barnes
White Cell Blood
Garland, George, M.D., '71
Troy, New York
Inhalation
Garland, Guy W., M.D., '67
Massachusetts
Gates, V. Bruce, (LL.B.), M.D., '69
Gay, Catharine C., M.D., '78
New York
Dr. Farnsworth
Bronchitis
Gay, J. W., M.D., '70
New York
Gonorrhoea
Gehrett, B. F., M.D., '72
Pennsylvania

Dr. Proper
Asthma
Gerald, F. L., M.D., '69
Gerald, M. W., M.D., '72
Massachusetts
Dr. Keiley
Labor
Gibson, F., M.D., '78
W. Virginia
Santonin
Giesea, Frederick A., M.D., '69
Gilbert, D., M.D., '66
Pennsylvania
Gilbert, F. B., M.D., '73
Pennsylvania
Faculty
Baths
Gildner, David, M.D., '71
Berlin, Canada
Anaemia
Giles, C. R., M.D., '74
Georgia
Dr. Bailey
Hip Disease
Gillespie, D. M., M.D., '68
Gilpin, G. E., M.D., '70
Rockville, Maryland
Spinal Irritation
Gish, A. S., M.D., '73
Pennsylvania
Dr. Fokes
Ovarian Tumor
Glass, James, M.D., '70
Pennsylvania
Electro-Chemical Therapy
Glenn, Thomas, M.D., '69
Goeriz, G. A., Honorary M.D., '72
Indiana
Goetchins, Lewis O., M.D., '78
New York
Dr. Westbrook
Cancer
Gomez, Antonia M., M.D., '75
Cuba
Dr. Buchanan
Nephritis
Gonzales, J. M., M.D., '77
Cuba
Dr. Siggins
Haematuria
Goodrich, V. E., M.D., '73
Vermont
Dr. Warren
Cystitis
Goodrich, E. E., M.D., '64
Pennsylvania
Goodrich, V. C., M.D., '69
Goodrich, V. C., M.D., '70
Vermont
Gonorrhoea
Goodrich, V. E., M.D., '73
Vermont
Dr. Warren
Cystitis
Goodwin, Martin, M.D., '68
Goodyear, Ephraim, M.D., '65
Massachusetts
Gordon, James A., M.D., '79
Maryland
Dr. Lindsay
Hemorrhoids
Gorden, L. S., M.D., '75
New York
Dr. Harbison
Dysmenorrhea
Gordon, Richard '60
New Jersey
Gore, Susan C., M.D., '72
Virginia
Dr. Stickney
Water
Goss, I. J. M., M.D., '58
Georgia
Gould, Henry, M.D., '70
New York
Nephritis
Graham, W. D., M.D., '69
Granger, Norman, M.D., '78
Pennsylvania
Dr. Smith
Sececio
Granger, William, M.D., '58
New York
Grant, Sidney D., M.D., '58
Connecticut
Gray, Thomas, M.D., '67
Pennsylvania
Green, G. W., M.D., '70
Pennsylvania
Calculi
Green, Reuben, Honorary M.D., '65
Boston
Green, Thomas H., M.D., '69
Greenenwald(t), J. H., M.D., '72
Pennsylvania
Dr. Davis
Diabetes
Gregon, Thomas W., M.D., '77
Canada
Dr. Peters
Mind over Matter
Groth, H. H., M.D., '75
Texas

Dr. Geiss
Belladonna
Grover, Lewis P., M.D., '69
Gruelin, C. H., M.D., '75
Pennsylvania
Dr. Abel
Action of Drugs
Guest, A. H., M.D., '75
England
Dr. Hill
Climatology

Haile, A. J., M.D., '70
Georgia
Catarrh
Haile, T. J., M.D., '70
Georgia
Hemorrhoids
Hakes, John D., '68
Hall, A. M., M.D., '75
Massachusetts
Dr. Jackson
Consumption
Hall, J. J., (M.D.), Honorary M.D., '64
Canada West
Haller, J. A., M.D., '73
Pennsylvania
Dr. Boles
Electricity
Halsted, J. G., M.D., '67
Canada West
Hamaker, D. S., M.D., '66
Pennsylvania
Hamilton, Robert P., M.D., '58
New York
Hamilton, R. H., M.D., '68
Hamilton, R. P. '60
New York
Hampton, H. J., M.D., '78
Georgia
Dr. Hunker
Scarlet Fever
Hanes, C. B., M.D., '64
Connecticut
Harbeson, William, M.D., '66
Pennsylvania
Harbin, S. N., M.D., '78
Indiana
Dr. Siggins
Hydropathy
Harper, C. N., M.D., '74
Australia
Dr. Brown
Hygiene
Harper, Thomas J., M.D., '69
Harper, William, M.D., '73
Tennessee
Dr. Gill
Fractures
Harrel, James C., M.D., '70
Kentucky
Subcutaneous Injection
Harriman, G. B., M.D., '70
Boston, Massachusetts
Dyspepsia
Harriman, S. K., M.D., '71
Stockton, Maine
Pneumonia
Harris, Charles, M.D., '67
Maine
Harris, George A., M.D., '73
New Jersey
Dr. Atkinson
Podophyllum
Harris, Gilbert S., M.D., '73
Michigan
Prof. Stickney
Luxations
Harrison, J. B., M.D., '70
Tennessee
Rickets
Harshburger, D. W., M.D., '70
Pennsylvania
Paralysis
Hartham, A., M.D., '75
New York
Dr. Parmiter
Purpura
Hartham, Amanda, M.D., '78
New York
Nr. Newton
Electro-Magnetism
Harthorne, Henry, M.D., '65
Pennsylvania
Hassock, Thomas, M.D., '66
Canada West
Hava, Gabriel, M.D., '75
Cuba
Dr. Buchanan
Yellow Fever
Haviland, N. H., M.D., '72
New York
Dr. Watkins
Rheumatism
Hawke, J. H., Honorary M.D., '67
Canada West
Hawkins, R. H., M.D., '70
Carlinsville, Illinois
Menorrhagia
Hawkins, T. M., M.D., '68
Hawley, C. M., M.D., '71
Cleveland, Ohio
Reflex Action
Hawley, F. C., Honorary M.D., '68

Hawley, Ira F., M.D., '78
New York
Dr. Hanly
Rheumatism

Hay(e)s, Walter, M.D., '72
New York
Dr. Jones
Gastritis

Haymond, Corydon L., M.D., '79
Maine
Dr. Berry
Action of Medicine

Haymond, C. D., M.D., '75
New York
Dr. McCurdy
Dentistry

Haymond, C. D., M.D., '75
New York
Periostitis

Hazard, F. T., M.D., '73
Virginia
Dr. Penopen
Aphthae

Hazen, Daniel L., M.D., '66
Massachusetts

Hazen, D. L., M.D., '66
Vermont

Hazzard, John, M.D., '66
Vermont

Heath, I. B., M.D., '77
Connecticut
Dr. Robertson
Erysipelas

Heisley, C. W., M.D., '69

Helfrich, Joshua, M.D., '65
Canada West

Heller, A. P., M.D., '54
Pennsylvania

Hellier, Frederick, M.D., '66
New York

Henderson, A., M.D., '74
Massachusetts
Dr. Scott
Hemorrhoids

Henderson, Frederick P., M.D., '67
Maine

Henderson, George S., M.D., '67
Maine

Henderson, J., M.D., '74
New York
Dr. Murray
Small Pox

Henderson, John, M.D., '73
Pennsylvania
Dr. Marras
Vesico-Vaginal Fistula

Henderson, Thomas, M.D., '66
New Hampshire

Henderson, William, Honorary M.D., '67
Maine

Henderson, W., M.D., '69

Hendrick, S. L., M.D., '70
New York
Metritis

Hendricks, Albert W., M.D., '70
Hazelton, Pennsylvania
Leucorrhoea

Hendrickson, Charles D., M.D., '68

Henning, J. A., Honorary M.D., '79
Indiana

Henry, Joseph, M.D., '68

Henry, Samuel, M.D., '68

Henwood, Hugh, M.D., '68

Heron, P. H., M.D., '66
Canada West

Hibbert, Joseph, M.D., '68

Hicks, —, (M.D.), Honorary M.D., '78
Connecticut

Higgins, C. P., M.D., '69

High, John K., M.D., '66
Canada West

Hill, Cyrus, M.D., '79
Pennsylvania
Dr. Burt
Casgrada

Hill, George E., M.D., '79
New York
Dr. Lake
Ulcers

Hill, Joseph B., M.D., '72
Canada
Dr. Nash
Skin Disease

Hill, J. R., M.D., '65
New Hampshire

Hillyard, M. H., M.D., '79
Michigan
Dr. Stearns
Ascites

Hinkle, W. S., M.D., '73
Pennsylvania
Dr. Grendly
Croup

Hobbs, H. C., M.D., '79
Indiana
Dr. Overman
Scurvy

Hobensack, J. B., (M.A.), M.D., '74
Pennsylvania
Dr. Hobensack
Hernia

Hobrum, T. H., M.D., '77
Honolulu

Dr. Siggins
Influenza
Hoffman, D. S., M.D., '73
Pennsylvania
Dr. Berryman
Cathartics
Hoitt, E. G., M.D., '79
New York
Dr. Buchanan
Cirrhosis
Hole, James M., M.D., '58
Ohio
Holland, W. H., M.D., '69
Hollemback, J. N., M.D., '77
Iowa
Dr. Jones
Epilepsy
Holmes, Marshall H., M.D., '66
Maine
Holton, John, M.D., '72
New Jersey
Dr. Buchanan
Fibroid Tumor
Hong, S. B., Honorary M.D., '68
Hooper, H. C., M.D., '67
Connecticut
Hoorickson, Joseph, M.D., '75
New York
Dr. French
Aphthae
Hopkins, N., (M.D.), Honorary M.D., '64
Canada West
Hotchkiss, M.S., M.D., '78
New York
Dr. Gardener
Hay Fever
Howard, E. L., M.D., '69
Howard, J. D., M.D., '70
Pennsylvania
Puerperal Fever
Howard, T. Ashburton '52
Manchester, England
Dr. S. J. W. Mintzer
Howell, Francis T., '60
Pennsylvania
Howell, George W., M.D., '53
Dr. T. Cooke
Retention of Placenta
Howell, G., M.D., '64
Pennsylvania
Hubbell, A. A., M.D., '69
Hudson, Edward, M.D., '70
Sanilac, Michigan
Scarlet Fever
Hughes, Levi B., M.D., '72
Pennsylvania
Dr. Magee
Malaria
Hume, S. T., M.D., '74
Maine
Dr. Hughes
Asthma
Hunt, William, M.D., '69
Hunter, Abram, M.D., '69
Hunter, David J., M.D., '69
Huntingdon, C. S., M.D., '72
New York
Dr. Haeton
Cholera Infantum
Huntingdon, R. C., M.D., '70
Painesville, Ohio
Croup
Hurd, W. H., (M.D.), Honorary M.D., '64
Canada West
Hurst, F. J., M.D., '73
New Jersey
Dr. Clarke
Psoriasis
Hurst, F. R., M.D., '75
Iowa
Dr. Jennings
Tetanus
Hustler, Nathan, M.D., '75
England
Dr. Sutton
Diagnosis
Hutchings, George H., Honorary M.D., '68
Hutchins, Henry T. Gale, M.D., '67
Hutchins, John W., M.D., '72
Canada
Dr. Rose
Scarlet Fever
Hutchinson, James, M.D., '74
Canada
Dr. Lee
Hemorrhage
Hyde, V. D., M.D., '71
Painesville, Ohio
Reflex Laws
Hylton, Thomas, M.D., '78
Massachusetts
Dr. Hylton
Gastric Fever

Inglis, George, M.D., '70
Canada
Hypertrophy
Ingraham, William P., M.D., '73
Michigan
Dr. Thomas
Albuminuria
Ingram, George A., M.D., '72
Pennsylvania

Dr. Davis
Vaccination

Irvine, Thomas, M.D., '69

Isaacs, Judah, M.D., '63, Honorary M.D., '65
Philadelphia

Ives, Robert, M.D., '73
New Jersey
Dr. Durand
Scrofula

Jackson, W., M.D., '71
Phymouth, Indiana
Cataract

Jacobus, Peter N., M.D., '58
New Jersey

Jacques, A. J., Honorary M.D., '72
Connecticut

James, D. P., M.D., '69

James, Henry, M.D., '66
Canada West

James, John, M.D., '70
Massachusetts
Hernia

James, Moses S., M.D., '65
Georgia

James, T. T., M.D., '74
New York
Dr. Brown
Yellow Fever

Janes, Charles A., M.D., '74
Massachusetts
Dr. Scott
Hydrocele

Janey, Joshua D., (M.D.), Honorary M.D., '71
New Jersey

Jardine, A., M.D., '64
Connecticut

Jaynes, A. W., M.D., '71
Syracuse
Consumption

Jeffries, Howard, M.D., '69

Jenner, Peter, M.D., '68

Jennings, E. L., M.D., '71
St. Louis, Missouri
Tetanus

Jennings, J. B., (M.A.), M.D., '74
Virginia
Dr. Star
Catarrh

Jennings, R. T., M.D., '73
Georgia
Dr. Roberts
Leucorrhoea

Jennings, W. H., M.D., '74
New York
Dr. Jennings
Aneurism

Jerves, A. A., M.D., '77
England
Dr. Dixon
Diseases of Women

Joanson, Henry B., M.D., '79
Vermont
Dr. Shield
Kava Kava

Johnson, Edgar D., M.D., '58
Connecticut

Johnson, H. Clay, '55

Johnson, R., M.D., '75
New York
Dr. Faculty
Diphtheria

Johnstone, J. K., M.D., '70
Toronto, Canada
Insanity

Johnstone, J. R., M.D., '70
Toronto, Canada
Dysentery

Johnstone, William, M.D., '74
Canada
Dr. Barnes
Dyspepsia

Jolly, W. F., M.D., '69

Jones, Asa, M.D., '65
Pennsylvania

Jones, B. C., M.D., '69

Jones, Charles B., M.D., '69

Jones, D. W., M.D., '73
Virginia
Dr. Tees
Gastric Fever

Jones, E. G., M.D., '70
Maine
Reflex Action

Jones, George S., M.D., '72
Pennsylvania
Dr. Davis
Ulcers

Jones, Henry, M.D., '66
Virginia

Jones, Henry, M.D., '77
Maryland
Dr. Farr
Diarrhoea

Jones, James, M.D., '67
Pennsylvania

Jones, John J., M.D., '71
Utica, New York
The Action of Mind

Jones, P. Clayton, M.D., '73
Connecticut
Dr. Fetter
Hyoscyamus

Jones, Richard, M.D., '65
Pennsylvania
Jones, William P., '60
Pennsylvania
Jordan, Robert J., M.D., '73
England
Dr. Jacques
Veratrin
Jossflyn, M. E., M.D., '79
Massachusetts
Dr. Buchanan
Skin Diseases

Kay, I. H., M.D., '74
England
Dr. Airey
Ulcers
Kay, John P., M.D., '65
Canada West
Kay, Joshua R., M.D., '79
Michigan
Dr. Thrasher
Ophthalmia
Keim, Robert, '52
Philadelphia
Dr. S. D. Burdett
Keith, B., (M.D.), Honorary M.D., '64
Canada West
Keith, G. W., M.D., '69
Kelemen, Attila J., (M.D., University of Pesth, Hungary), M.D., '52
Newark, N. J.
Atrophia Pulmonalis etc.
Keller, F. G., M.D., '75
Ohio
Dr. Bouton
Influenza
Kelley, Dave, M.D., '68
Kelly, H., M.D., '67
Missouri
Kelly, P. M., M.D., '69
Kempton, W. C., Honorary M.D., '72
Kansas
Kenney, M. B., M.D., '70
Massachusetts
Tuberculosis
Kenney, Robert M.D., '67
Canada West
Kensil, Rowland T., '60
Pennsylvania
Kent, Rufus, M.D., '66
Vermont
Kerns, Joseph '60
Pennsylvania
Kilborn, Henry F., M.D., '69
Kilborn, Henry W., M.D., '69
Kilburn, A. L., M.D., '79
Vermont
Dr. Templeton
Epilepsy
Kilburn, H., Honorary M.D., '74
Pennsylvania
Kilburn, H. B., M.D., '77
Dr. Gamble
Tubercula
King, Alexander, M.D., '67
Pennsylvania
King, Charles, M.D., '64
California
King J. Watson, M.D., '65
Connecticut
King, O. A., M.D., '65
Massachusetts
King, W. Henry, M.D., '58
Canada
Kirk, A. S. '60
Mississippi
Kirkbride, J. J., M.D., '75
Mississippi
Dr. Thackara
New Remedies
Kirkman, E., M.D., '74
New Jersey
Dr. Kinnard
Consumption
Kirkman, Edward, M.D., '78
New Jersey
Dr. Clay
Scarlet Fever
Kitchen, George H., M.D., '70
Pennsylvania
Diphtheria
Kline, D. D., M.D., '65
Pennsylvania
Kline, J. H., M.D., '67
Pennsylvania
Kluce, T. H., M.D., '79
Michigan
Dr. Force
Cerebral Diseases
Knight, C. B., M.D., '70
New York
Action of Remedies
Knight, Daniel M.D., '79
Rhode Island
Dr. Henry
Amenorrhaea
Knight, J., M.D., '67
New York
Knight, Overton C., M.D., '65
Canada West
Knowles, Edwin G., M.D., '79
Connecticut

Dr. Kehnroth
Temperaments
Kohler, Fredrick S., '60
Pennsylvania
Konwendeshon, M.D., '78
Canada
Dr. Clark
Wild Indigo
Kordenat, Frederick W., M.D., '78
Pennsylvania
Dr. Gray
Remedies

La Bella, Martin J., M.D., '79
Vermont
Dr. Sunk
Cholera
Lake, D., M.D., '71
Bloomfield, Canada
Action of Bromine
Lake, Samuel K., M.D., '68
Lamoreaux, Charles H., M.D., '75
Dr. Cannon
Rheumatism
Landes, Simon M., M.D., '53
Ephrata, Pennsylvania
Dr. S. M. Eby
Lane, Charles, H., M.D., '73
Pennsylvania
Dr. Fowler
Systitis
Lane, William A., M.D., '73
Dr. Peters
Hysteria
Laughlin, James W., M.D., '71
Amboy, New Jersey
Scarlatina
Leahey, Mich. M., M.D., '78
Massachusetts
Dr. Buchanan
Diarrhaea
Leaver, George, M.D., '75
England
Dr. Chatham
Aphonia
Lee, H. W., M.D., '70
Pennsylvania
Eczema
Leonard, Volney, M.D., '79
Pennsylvania
Dr. Fulmer
Lobelia
Lester, D., M.D., '78
New York
Dr. Dodds
Dyspepsia

Lewis, George, M.D., '64
Maine
Lewis, Reading, M.D., '72
Pennsylvania
Dr. Bassett
Aconite
Lewis, Sands, M.D., '69
Lewis, Thomas, '60
Pennsylvania
Ligon, W. D., M.D., '74
Texas
Dr. Wigfale
Urine Disease
Linderman, F. L., M.D., '64
Ohio
Little, Oscar P., M.D., '71
White Sulphur Springs, Virginia
Haematuria
Little, Oscar P., Honorary M.D., '71
Virginia
Livingston, J. K., M.D., '75
Pennsylvania
Dr. Buchanan
Fractures
Long, John '60
Pennsylvania
Longacre, Joseph L., M.D., '79
New Jersey
Dr. Flanigan
Jaborandi
Looney, J. J., M.D., '69
Lounsberry, John F. '52
Philadelphia
Lovejoy, J. W., M.D., '67
New York
Lovejoy, S. T., M.D., '67
Massachusetts
Low, Phoebe, M.D., '72
New York
Dr. Clark
Tuberculosis
Lowery, J. W., M.D., '75
Texas
Dr. Lowery
Dropsy
Ludlam, J., M.D., '74
New Jersey
Dr. Hampton
Ophthalmia

MacDonnell, D., M.D., '69
Magee, Reverend William T., M.D., '63
Magee, W. T., M.D., '69
Maisatan, F., M.D., '79
Virginia
Dr. Burchell
Aphthae

Manly, Bradford Sherman, '60
Vermont
Manly Marcus Marcollus, '60
Vermont
Manly, William Judson, '60
Louisiana
Mann, T. M., M.D., '64
New York
Manning, W., M.D., '74
Pennsylvania
Dr. Williams
Hooping Cough
Mark, Robert, M.D., '75
Canada
Dr. Burns
Jaundice
Martin, W. H., M.D., '78
Kentucky
Dr. Tracy
Ophthalmia
Master, G. A., M.D., '74
Ohio
Dr. Van Meter
Sciatica
Mathews, J., M.D., '73
Ohio
Dr. Schenk
Mental Emotions
Matlack, M. J., M.D., '75
Pennsylvania
Dr. Faulkner
Diseases of Children
Mayer, Daniel, (M.D.), Honorary M.D., '64
West Virginia
McAleer, George, M.D., '69
McCausland, W. J., M.D., '72
Pennsylvania
Dr. Buchanan
Typhoid Fever
McClintock, J. R. B. '60
McClure, Robert, M.D., '65
Pennsylvania
McColl, Alexander, M.D., '72
Canada
Dr. Clark
Nerve Disease
McColl, Charles, M.D., '68
McCollom, A., M.D., '75
New York
Faculty
Alveolar Abscess
McComas, James, M.D., '72
(Mississippi) (Missouri)
Dr. Buchanan
The Spleen
McCoomber, W., M.D., '66
New York
McCoy, E., M.D., '75
Pennsylvania
Dr. Thompson
Amaurosis
McDonald, James, M.D., '74
California
Dr. Jackson
Erysipelas
McDonald, Robert, M.D., '68
McDonald, James, M.D., '66
Massachusetts
McDowell, H. C., M.D., '70
Ohio
Diphtheria
McElroy, Thomas, M.D., '71
Bristol, Pennsylvania
Enlargement of the Tongue
McGhie, B. T., M.D., '69
McGregor, N., M.D., '64
Canada West
McGuire, J. A., M.D., '69
McHenria, J., M.D., '67
Missouri
McIlween, (McKilveen) J. B., M.D., '70
South Carolina
Chronic Diarrhoea
McIntosh, F., M.D., '64
Canada West
McIntosh, James H., M.D., '68
McIntosh, John Wesley, '60
North Carolina
McIntyre, L., M.D., '69
McKendyl, C., M.D., '65
Pennsylvania
McLean, Duncan, M.D., '69
McLein, George, M.D., '68
McLellan, Alexander, M.D., '68
McMichael, Abraham, M.D., '67
Canada West
McMurray, James, M.D., '72
Pennsylvania
Dr. McMurray
Lobelia
McQuillan, R., Honorary M.D., '74
Ohio
Mead, Daniel Jr. '52
Woodstown, New Jersey
Mease, J. M., M.D., '72
North Carolina
Dr. Buchanan
Sun Stroke
Mellor, George, M.D., '70
Pennsylvania
Synovitis
Merino, S., M.D., '64
Cuba
Merkle, S. B., M.D., '68

T. Meru, M.D., '66
Cuba
Myers, Daniel E., M.D., '68
Meyers, William, M.D., '73
Missouri
Dr. Steinway
Scabies
Miles, T. M., M.D., '70
Pennsylvania
Cardiac Disease
Miller, A. R., M.D., '77
West Virginia
Dr. Morgan
Haematuria
Miller, E., M.D., '75
New Hampshire
Dr. Carble
Tuberculosis
Miller, John A., M.D., '64
New Jersey
Miller, M. N., M.D., '63
Miller, R. D., M.D., '79
Michigan
Dr. Parmiter
Dyphtheria
Milliken, Roscoe G., M.D., '65
Mills, W. G., M.D., '74
Utah
Dr. Hale
Disease of Spine
Mixter, E. S. M.D., '74
Connecticut
Dr. Harbison
Puerperal Fever
Moe, M. C., M.D., '69
Moffatt, W. C., M.D., '78
Iowa
Dr. Crisman
Chronic Diarrhaea
Monroe, W. C., M.D., '74
New York
Dr. Monroe
Bromine
Montgomery, Joseph R., M.D., '79
Pennsylvania
Dr. De Beust
Opium
Moore, Howard, M.D., '69
Moore, J. M., M.D., '78
New York
Dr. Glines
Fever
Moore, R., M.D., '64
Kansas
Morden, L. A., M.D., '70
India
Diseases of Children
Morgan, K., M.D., '77
Missouri
Dr. Turner
Aconite
Morrow, Samuel, M.D., '65
Indiana
Morse, F. A., M.D., '77
New Hampshire
Dr. Arnold
Ague
Morton, Thomas, M.D., '64
Philadelphia
Mott, H. T., M.D., '67
North Carolina
Moyer, E. J., M.D., '75
Faculty
Diagnosis
Muir, J., M.D., '68
Mulligan, P. J., M.D., '58
North Carolina
Mulligan, Patrick J., M.D., '60
Florida
Munger, James S., M.D., '68
Murray, Charles, M.D., '64
New York
Musas, George W., M.D., '69
Musser, Peter C., M.D., '58
Virginia
Musser, William, M.D., '75
Illinois
Dr. Harrington
Gout
Myers, Charles F., M.D., '79
Dr. Holton
Intermittent Fever
Myers, Elias L., M.D., '71
Leipersville, Pennsylvania
Amenorrhoea
Myers, John H., M.D., '71
Milton, Pennsylvania
Mental Improvement
Myers, William H., M.D., '71
Philadelphia
Ligation of Vessels

Nash, John, M.D., '68
Neall, Charles H., M.D., '75
Dr. Buchanan
Synovitis
Nebeker, Aquila, M.D., '72
Pennsylvania
Dr. Buchanan
Hernia
Nelson, Harvey, M.D., '79
Indiana
Dr. Beauford
Pleurisy

Neufeld, F. L., M.D., '69
Nevling, T. S., M.D., '70
Pennsylvania
Peritonitis
Newburgh, William J., M.D., '69
Newell, G., M.D., '65
New York
Dr. Hopkins
Asthma
Newman, Edwin, M.D., '68
Newman, G. B., M.D., '79
Michigan
Dr. Parsons
Anasarca
Newton, Horatio G., M.D., '58
Newton, John L., M.D., '73
Canada
Dr. Clark
Cancer
Newton, R. D., M.D., '75
Kansas
Dr. Warren
Materia Medica
Nicholas, J. J. (B.), M.D., '72
Pennsylvania
Dr. Hill
Hydrocyanic Acid
Nieberger, James A., M.D., '69
Noetling, John '60
Pennsylvania
Noonan, W., M.D., '75
Georgia
Dr. Green
Luxations
Northrup, Erie W., M.D., '75
Pennsylvania
Dr. Phillips
Tubercula
Norton, C. W., M.D., '67
Maine
Noxon, Allen, M.D., '68

Oakes, Ephraim, M.D., '73
Massachusetts
Dr. Stone
Rheumatism
Oakes, Hobert, M.D., '75
Maine
Dr. Wood
Inflammation
O'Brien, P., M.D., '67
Florida
O'Brien, Philip T., M.D., '72
Massachusetts
Dr. Donaldson
Pertussis
Odatt, C. A. D., M.D., '77
Pennsylvania
Dr. Zorns
Nutrition
O'Hara, Joseph, M.D., '65
Philadelphia
Olbe, George S., M.D., '58
Olinder, Daniel, M.D., '66
Michigan
Omillian, J. H., M.D., '69
Orr, David (F.), Honorary M.D., '72
Missouri
Orton, D. S., M.D., '67
New York
Osborn, D. O., M.D., '70
Athens, Georgia
Gonorrhoea
Osborn, Francis, M.D., '73
Ohio
Dr. McCarty
Hygiene
Osborn, N. C., M.D., '70
Athens, Georgia
Lupus
Owen, B. A., M.D., '74
Oregon
Dr. Adams
Metritis

Packard, James A., M.D., '70
Pennsylvania
Dysentery
Paine, Oliver D. W., '60
Ohio
Paine, —— (M.D.), Honorary M.D., '66
Scotland
Pannybacker, Jacob, M.D., '54
Pennsylvania
Pape, Leoplold, M.D., '70
Sandusky, Ohio
Mind over Matter
Park, Ira R., M.D., '70
Pennsylvania
Dentition
Parkinson, William, M.D., '68
Parks, A. T., M.D., '74
Pennsylvania
Dr. Park
Lycopin
Parr, John, M.D., '79
Michigan
Dr. Burch
Chloral Hydrate
Parsons, John H., M.D., '71
Phelps, New York
Tobacco
Patrick, W. R., M.D., '75
Pennsylvania

Dr. De Beust
Paralysis
Patterson, W. K., M.D., '68
Paul, David, M.D., '65
Pennsylvania
Paul, J. Fletcher, M.D., '74
Massachusetts
Dr. Scott
Croup
Payne, E., M.D., '69
Peacock, John, M.D., '64
Philadelphia
Pecher, William H., M.D., '69
Peck, M. G., M.D., '78
New York
Dr. Andrews
Jaundice
Pedrick, Thomas S., M.D., '54
Philadelphia
Dr. T. Cooke
Pemoy, E., M.D., '66
New York
Pennebaker, Jacob '52
Mt. Joy, Pennsylvania
Dr. S. M. Eby
Peraltay, F. G., M.D., '79
Cuba
Dr. Britz
Hydrocyanic Acid
Perkins, Benjamin, M.D., '67
Mississipppi
Perkins, Joseph C., M.D., '79
New Hampshire
Dr. Publes
Rhus Aromatic
Perkins, T. T., M.D., '74
Maine
Dr. Gardiner
Insanity
Perry, J. W., Honorary M.D., '67
Georgia
Peyton, L. D., M.D., '73
Kentucky
Dr. Hutchings
Action of Medicine
Phelps, W. J., M.D., '72
Mississippi
Dr. Buchanan
Dysentery
Phillips, Abel P., M.D., '67
Pennsylvania
Phillips, C. J., M.D., '70
Pennsylvania
Cyanosis
Phillips, R. E., M.D., '72
New York
Dr. Hill
Pneumonia
Phinnell, John T., M.D., '69
Pierce, Sid W., M.D., '75
Maine
Dr. Stevenson
Diabetes
Pinard, P. H. A., M.D., '78
Connecticut
Dr. Drake
Dyspepsia
Pinkerton, R. A., M.D., '69
Piper, A., M.D., '64
New Hampshire
Piper, George J., M.D., '67
Pennsylvania
Piper, Thomas, M.D., '69
Pixley, E. S., M.D., '78
Massachusetts
Dr. Burchell
Asphyxia
Platt, James A., M.D., '70
Danville, Pennsylvania
Rheumatism
Porter, B. F., M.D., '78
South Carolina
Dr. Siggins
Chronic Diarrhaea
Posey, David, (M.D.), M.D., '58
Mississippi
Post, James R., M.D., '70
Pictou, Canada
Tabes Mesenterica
Post, George H., M.D., '74
New York
Dr. Post
Croup
Potts, John S., M.D., '73
Missouri
Dr. Stuart
Addison's Disease
Priest, S. C., M.D., '69
Pritchard, J. J., M.D., '74
Iowa
Dr. Cone
Bright's Disease
Procter, Columbus J., M.D., '58
Philadelphia
Proper, James L., (M.D.), M.D., Honorary, '71
Pennsylvania
Putnam, W. F., M.D., '77
Maine
Dr. Buchanan
Consumption
Pynchon, E., M.D., '72
New York

Dr. Jacques
Diagnosis

Querner, Emil, Honorary M.D., '67
Pennsylvania
Quertuns, Edward, M.D., '65
Pennsylvania
Quick, T. S., M.D., '73
New York
Dr. Smith
Uterine Disease
Quinn, S. S., M.D., '69
Quinn, Thomas, M.D., '67
Canada West

Rae, Hugh H., M.D., '66
Canada West
Rallston, Lewis, M.D., '77
Dr. Murphy
Pneumonia
Ramsay, Robert, M.D., '68
Randall, Jr. O. G., M.D., '79
Massachusetts
Dr. Jones
Paralysis
Randle, G. R., M.D., '70
Brooklyn, New York
Aneurysm
Reich, B. F., M.D., '69
Reich, George W., M.D., '71
Marietta, Pennsylvania
Chlorosis
Reid, Henry W., M.D., '73
New Jersey
Dr. Hill
Diagnosis
Reilly, C. W., M.D., '69
Reuss, William, M.D., '75
Pennsylvania
Faculty
Leptandrin
Reynolds, R. M., '60
Pennsylvania
Reynolds, S. F., '60
Pennsylvania
Rhoades, J. H., M.D., '70
Pennsylvania
Small-pox
Rhodes, G. W., M.D., '73
Virginia
Dr. Gilbert
Diabetes
Rich, John G., M.D., '58
Pennsylvania
Richards, Daniel, M.D., '65
New York
Richardson, F. C., M.D., '69

Richardson, Isaac K., M.D., '69
Richardson, James, M.D., '71
Leeds, England
Cerebral Disease
Richardson, John, M.D., '64
Wisconsin
Richardson, T., (M.D.), Honorary M.D., '65
Riffer, S., M.D., '75
West Virginia
Dr. Messer
Urinary Diagnosis
Riggs, Albert M., M.D., '75
Massachusetts
Dr. Siggins
Epilepsy
Ripley, W. K., M.D., '70
New Hampshire
Tabes Mesenterica
Rittenhouse, —— (M.D.), Honorary M.D., '65
Philadelphia
Rittenhouse, Alvan, M.D., '67
Pennsylvania
Rittenhouse, Henry, M.D., '63
Rizer, P. T., M.D., '75
Maryland
Dr. Black
Will Power
Robbins, C. B., M.D., '64
Canada West
Robbins, J. W., M.D., '73
New Jersey
Dr. Dixon
Carditis
Roberts, James A. '60
Virginia
Roberts, L. P., M.D., '67
New York
Roberts, M. B. '52
Philadelphia
Robertson, George A., M.D., '64
New Jersey
Robertson, Henry, M.D., '68
Robertson, J. C., M.D., '67
Connecticut
Robertson, T. S., Honorary M.D., '68
Robinson, C. M., Honorary M.D., '72
Missouri
Robinson, Fernando S., M.D., '69
Robinson, G. F., M.D., '77
West Virginia
Dr. Stearns
Abscesses
Robinson, R. J., M.D., '73
Ohio
Dr. Forbes
Eczema

Robinson, Thomas, M.D., '74
Canada
Dr. McLean
Typhoid Fever
Robinson, William F., M.D., '79
Texas
Dr. Tinsley
Yellow Fever
Robinson, William O'Dell, M.D., '67
Canada West
Rogers, H. N., M.D., ——
Rogers, Levi, M.D., '66
Pennsylvania
Rogers, Robert, M.D., '66
New Hampshire
Rogers, Thomas A., M.D., '67
New York
Rohback, A. G., M.D., '68
Rose, E. A. B., M.D., '72
Canada
Dr. Rose
Pneumonia
Rose, Francis, M.D., '69
Rose, H., M.D., '69
Ross, John, M.D., '69
Rothermel, Elias '52
Dr. T. Cooke
Lawrenceville, Pennsylvania
Rowden, Phil, M.D., '70
Indiana
Vaccination
Rowland, J. S. '60
North Carolina
Rowth, S. S., M.D., '75
New Jersey
Dr. Pringle
Hydrastis
Ruffell, George T., M.D., '75
Pennsylvania
Dr. Abel
Premature Decay of Teeth
Rush, Charles S., M.D., '70
New Hampshire
Erysipelas
Russell, Richard, M.D., '73
Massachusetts
Dr. Ames
Aneurism
Rutherford, C., M.D., '64
Canada West

St. Maria, Elizabeth, M.D., '78
Canada
Dr. De Beust
Races
Salisbury, C., M.D., '75
Ohio
Dr. Bernard
Cancer
Sanborn, R. H., M.D., '70
Michigan
Atrophy
Sands, A. E., M.D., '78
New York
Dr. Day
Gall Stones
Sansom, Samuel, M.D., '79
England
Dr. De Beust
White Softening
Santee, Thomas, M.D., '72
Pennsylvania
Dr. Peacock
Phrenitis
Sargent, J. A., M.D., '78
Pennsylvania
Dr. Shannon
Bright's Disease
Satterlee, D. S., Honorary M.D., '70
Scherff, A., M.D., '74
Pennsylvania
Dr. Stevens
Tonsillitis
Schofield, Thomas, M.D., '73
England
Dr. Parkinson
Coxalgia
Schultz, Peter H., Honorary M.D., '79
Pennsylvania
Scott, Stanley, M.D., '68
Scranton, H., (M.D.), Honorary M.D., '78
New York
Sebol, F., M.D., '77
New York
Dr. Norman
Yellow Fever
Seher, H. L., M.D., '75
Pennsylvania
Dr. Abel
Caries
Selick, Ephraim, M.D., '73
Ohio
Dr. Ryder
Catarrh
Selover, Charles B., M.D., '74
New York
Dr. Monroe
Malaria
Sexton, George, Honorary M.D., '72
England
Sham, T. C., M.D., '77
New York
Dr. Day
Bright's Disease

Shank, William, M.D., '69
Shattuck, A. L., M.D., '69
Shaw, G. J., M.D., '66
Maine
Sherbenford, W. R., M.D., '65
Canada West
Sherman, —— (M.D.), Honorary M.D., '78
Maine
Shermer, D. A., M.D., '70
Fallston, Maryland
Atrophy of Liver
Shiffler, William, M.D., '65
Pennsylvania
Shirrey, Peter F., M.D., '70
Pennsylvania
Diphtheria
Shoemaker, Isaac, M.D., '66
New York
Shoemaker, John, M.D., '72
Pennsylvania
Dr. Querner
Typhoid Fever
Shunk, William '52
West Chester, Pennsylvania
Dr. J. W. Cooper
Sidney, A. W., (M.D.), Honorary M.D., '64
Canada West
Sievestra, Donald, M.D., '64
Cuba
Siggins, J. J., M.D., '70
Pennsylvania
Syphilis
Sigismund, J. M., M.D., '72
Germany
Dr. Hill
Abscess Antrum
Sigismund, S. B., M.D., '72
Germany
Dr. Hill
Dental Periostitis
Silvernail, William M., M.D., '70
Canandaigua, New York
Uterine Hemorrhage
Simmon, J. T., Honorary M.D., '67
Georgia
Simmons, Francis, M.D., '70
New York
Inflammation
Simmons, J. R., M.D., '64
Georgia
Simmons, J. R., Honorary M.D., '77
Georgia
Simmons, Thomas, (M.D.), Honorary M.D., '70
Brooklyn
Simms, John H., M.D., '54
Wilmington, Delaware
Dr. John Simms
Simpson, R. A., M.D., '65
Pennsylvania
Simpson, Samuel, M.D., '72
(Ohio) (Missouri)
Dr. Gray
Asphyxia
Sinclair, John M., M.D., '67
Canada West
Singleton, Thomas A., M.D., '73
Georgia
Dr. Sears
Malarial Fever
Skein, Fred, M.D., '64
Michigan
Slack, Watson, M.D., '75
Mississippi
Dr. Buchanan
Chronic Diseases
Slee, A., M.D., '75
Ohio
Dr. Buchanan
Uterine Catarrh
Sleeper, Joseph J., M.D., '75
Pennsylvania
Dr. Sleeper
Consumption
Sleeper, T. D., M.D., '70
New Jersey
Intermittent Fever
Smith, A. B., M.D., '58
Maryland
Smith, A. J., M.D., '72
New York
Dr. Buchanan
Prolapsus Uteri
Smith, A. L., M.D., '69
Smith, C. B., M.D., '79
New York
Dr. Smith
Fennel Seed
Smith, Ezra A., M.D., '73
Vermont
Dr. Vincent
Measles
Smith, E. C., M.D., '70
New York
Bright's Disease
Smith, G. W., Honorary M.D., '69
Indiana
Smith, H. D., M.D., '69
Smith, John D. '60
Pennsylvania
Smith, J. M., M.D., '73
Kentucky
Dr. Rose
Yellow Fever

Smith, John, M.D., '71
Middleton, New York
Hygiene
Smith, J. K., M.D., '73
Pennsylvania
Dr. Bissell
Pertussis
Smith, John, M.D., '79
Pennsylvania
Dr. Hooper
Albuminuria
Smith, M. D., M.D., '73
Vermont
Dr. Trall
Fever
Smith, M. H., Honorary M.D., '70
Smith, Robert, M.D., '66
New York
Smith, Samuel D. '60
Delaware
Smith, Simon, M.D., '78
New York
Dr. A. C. Jackson
Phthisis
Smith, S., M.D., '78
New York
Dr. Buchanan
Fennel
Smith, T. S., Honorary M.D., '77
England
Smith, William H. '60
Delaware
Smith, W. O., M.D., '77
Pennsylvania
Dr. Weaver
Rheumatism
Smith, Dennis E., (M.D.), Honorary M.D., '66
Brooklyn
Soules, S. George, M.D., '79
Vermont
Dr. Templeton
Nutrition
Southard, Benjamin H., M.D., '70
Pictou Canada
Brain Atrophy
Spanogle, Samuel, M.D., '52
Pennsylvania
Spencer, Henry, M.D., '73
Massachusetts
Dr. Willard
Tetanus
Sprague, O. C., M.D., '78
New York
Dr. Cottondon
Electricity
Sprogle, S. '56
Squire, T. O., M.D., '69
Squire, W., M.D., '67
Tennessee
Stafford, C. I., M.D., '74
Michigan
Dr. Stevens
Pneumonia
Stark, Alex., M.D., '73
Canada
Dr. Buchanan
Consumption
Starr, John P., M.D., '72
Georgia
Dr. Warren
Inflammation
Stearns, Levi, M.D., '71
Hillsdale, Michigan
Convulsions
Stebbins, James, M.D., '74
Pennsylvania
Dr. Taggart
Measles
Steel, Daniel L., M.D., '70
Pictou, Canada
Relapsing Fever
Steel, John, M.D., '74
Canada
Dr. Hayden
Hydrophobia
Steen, J. H., M.D., '69
Stevens, A. B., M.D., '79
Pennsylvania
Dr. Stevens
Tuberculosis
Stevens, John L., '60
England
Stevens, John, M.D., '72
Maine
Dr. W. Watters
Emphysema
Stevens, J. R., M.D., '74
New Hampshire
Dr. Reed
Spinal Disease
Stevenson, John M., Honorary M.D., '79
New Jersey
Stevenson, M., M.D., '70
Pennsylvania
Senile Atrophy
Stewart, Benjamin, M.D., '79
New Jersey
Dr. King
Parturition
Stewart, C., '60
Pennsylvania
Stewart, James, M.D., '70
Philadelphia
Electricity

Stewart, R., M.D., '68
Stillman, A. G., M.D., '64
Vermont
Stockton, E. C., M.D., '64
Pennsylvania
Stockton, E. C., Honorary M.D., '66
Stoddard, C. B., M.D., '75
New York
Faculty
Surgical Proceeding on Iron
Stokes, R. S., M.D., '64
Connecticut
Stone, H., M.D., '64
Montreal
Stout, O. C., M.D., '78
New York
Dr. Bottum
Catarrh
Stout, W. C., M.D., '71
Cambridge, Ohio
Menorrhagia
Stowell, T., M.D., '68
Strawn, H., M.D., '74
Massachusetts
Dr. Holland
Bronchitis
Streeter, C. A., M.D., '70
Massachusetts
Scarlet Fever
Streeter, H., (M.D.), Honorary M.D., '75
New York
Stuard, T., M.D., '66
Philadelphia
Sutherland, J. H., M.D., '67
Canada West
Sutherland, Lachlin, M.D., '66
Canada West
Sutton, W., Honorary M.D., '70
Swain, R., M.D., '71
Philadelphia
Laws of Health
Sweeney, Albert, M.D., '69
Sweet, H. A. (M.D.), Honorary M.D., '65
New York
Swigart, Joshua, M.D., '70
Maryland
Dyspepsia

Taft, Louis W., M.D., '68
Talbot, E. L., M.D., '75
Pennsylvania
Dr. Caterson
Electricity
Tarr, William H., M.D., '58
Maryland
Taylor, David, M.D., '74
California
Dr. Parker
Pleurisy
Taylor, Edward W., M.D., '79
Rhode Island
Practitioner
Dyspepsia
Taylor, J. S., M.D., '68
Taylor, W. A., M.D., '79
Pennsylvania
Dr. Cooper
Nephritis
Taylor, Zane B., M.D., '79
Pennsylvania
Dr. Cooper
Ophthalmia
Teeple, Hiram, M.D., '68
Templeton, S., M.D., '75
Vermont
Dr. Scott
Psoriasis
Tempsteten, Elijah, M.D., '77
Vermont
Dr. Ayers
Small Pox
Terryberry, J. G., M.D., '68
Thackara, J. C., M.D., '69
Theel, F. G., M.D., '79
Germany
Dr. Buchanan
Aconite
Thomas, Charles, D., M.D., '73
New York
Dr. Anderson
Cholera
Thomas, Enoch, M.D., '79
Ohio
Dr. Evans
Stricture
Thomas, John L., '60
Pennsylvania
Thomas, Josiah, Honorary M.D., '68
Thomas, Oscar F., M.D., '66
New York
Thomas, R., Honorary M.D., '66
Thompson, B., M.D., '70
Iowa
Inhalation
Thompson, J., M.D., '65
Pennsylvania
Thompson, James, M.D., '64
England
Thompson, John H., M.D., '58
Pennsylvania
Thompson, Joseph, M.D., '73
Georgia
Dr. Sears
Gout

Thompson, J. Y., M.D., '69
Thompson, William, M.D., '75
Massachusetts
Dr. W. Scott
Diseases of Liver
Thorne, Joseph, M.D., '54
Ohio
Thornley, Joseph, M.D., '74
England
Dr. Miles
Small Pox
T(h)railkill, John W., M.D., '64
Mississippi
Tiffanny, George, M.D., '79
Connecticut
Dr. Pelitier
Consumption
Tilden, A. E., M.D., '78
New York
Dr. Bottum
Nervines
Tinsley, William C., M.D., '67
Georgia
Titcomb, George P., M.D., '68
Titus, William, M.D., '66
New Jersey
Tobold, L. E. F., M.D., '79
Pennsylvania
Dr. Fulmer
Cystitis
Todd, M. A., M.D., '75
New York
Dr. Todd
Jaundice
Tollerton, L. H., M.D., '78
New York
Dr. Hoffshartzen
Nutrition
Townsend, George D. '60
Pennsylvania
T(h)railkill, J. W., M.D., '64
Mississippi
Traver, A. J., M.D., '66
Pennsylvania
Trice, W. G., M.D., '78
Pennsylvania
Dr. Jones
Chloral
Trotter, Isaac, M.D., '75
Connecticut
Dr. Wooster
Fistula
Troyer, T. S., M.D., '74
Illinois
Dr. Petton
Dysentery
Trudgion, William, M.D., '79
Wisconsin
Dr. Queen
Skin Diseases
True, Alfred M., M.D., '71
Newburyport, Massachusetts
Skin Diseases
True, C. C., M.D., '77
Vermont
Dr. Fry
Amputations
Truman, A. W., M.D., '70
New York
Acupressure
Trumbower, John, M.D., '72
Pennsylvania
Dr. Jones
Veratrum Viride
Tucker, J. R., M.D., '70
Georgia
Convulsions
Turner, James T., M.D., '72
Pennsylvania
Dr. Davis
Rubeola
Tyson, James, M.D., '66
New York

Ullyott, Henry, M.D., '67
Canada West
Urquhart, David Colon, '60
Pennsylvania
Ussher, B. B., M.D., '70
Ohio
Ophthalmia

Van Scoy, E., M.D., '72
New York
Dr. Walman
Neuralgia
Vernon, David A. '52
West Chester, Pennsylvania
Dr. J. W. Cooper
Villaret, C. J., M.D., '70
New York
Typhoid Fever
Vining, George, M.D., '67
Massachusetts
Vinning, David T., M.D., '58
Massachusetts
Virgil, W. A. M., M.D., '75
New York
Dr. Rosenberg
Pericarditis
Voice, James, M.D., '79
New York
Dr. Craig
Phloridzine

Wade, A. P., M.D., '63
Wagner, M., M.D., '71
Philadelphia
Ulcers
Waide, T. V., M.D., '69
Walk, F., M.D., '70
Carlisle, Pennsylvania
Cancer
Walker, A. B., M.D., '72
Florida
Dr. Walker
Gelsemin
Walker, A. B., M.D., '73
Ohio
Dr. Hooper
Gall Stones
Walker, Charles E., M.D., '79
Georgia
Dr. Tinsley
Gelsemin
Walker, G. B., M.D., '77
Illinois
Dr. Woodworth
Phlebitis
Walker, James, M.D., '65
Philadelphia
Walker, R. J., M.D., '69
Walker, W., M.D., '68
Wallace, Lemuel, M.D., '71
Palmyra, New Jersey
Worms
Wallace, L., M.D., '72
New Jersey
Dr. Janney
Bilious Fever
Wallace, William H., M.D., '73
New York
Dr. Rivers
Climate
Walmsly, James A., M.D., '70
New Jersey
Malarial Fever
Walter, David G., M.D., '70
Pennsylvania
Hepatitis
Walton, George R., M.D., '73
New Jersey
Dr. Stickney
Catarrh
Walworth, John C., M.D., '69
Warburton, William, M.D., '66
Connecticut
Ward, C. A., M.D., '79
New Jersey
Dr. Russell
Cestoid Worm
Wardwell, C. W., M.D., '77
New York
Dr. Buchanan
Dyspepsia
Warner, J. C., M.D., '69
Warner, Richard, M.D., '69
Warren, Henry, M.D., '78
Massachusetts
Dr. Norton
Diphtheria
Wassezzery, B., M.D., '75
Pennsylvania
Dr. Meyers
Venereal Disease
Washburn, George C., M.D., '67
Vermont
Washburn, S. F., Honorary M.D., '68
Washington, Oct., M.D., '69
Waters, B. F., M.D., '77
Pennsylvania
Dr. Siggins
Cerebro-Spinal Disease
Waters, F. C., M.D., '75
New York
Dr. Walworth
Inflammation
Waters, Henry, M.D., '72
Maine
Dr. W. Watters
Cystitis
Watkins, A. V., M.D., '70
Almond, New York
Chlorosis
Watson, E., M.D., '74
Illinois
Dr. Thrope
Ophthalmia
Watson, George S., M.D., '71
Sedgwick, Maine
Catarrh
Watson, Henry, '56
Watson, Henry, '60
Ohio
Watson, John (M.D.), Honorary M.D., '64
Philadelphia
Watson, Joseph, M.D., '65
Massachusetts
Watson, William W., M.D., '66
Maine
Watters, William, M.D., '69
Watters, William, M.D., '70
Canada
Serous Inflammation
Watts, George T., M.D., '70
Georgia
Pneumonia

Vaugh, T. R., M.D., '70
New York
Ophthalmia
Veaver, H. K., M.D., '67
New York
Webb, Edgar, M.D., '69
Webster, D. P., M.D., '67
Vermont
Weigel, Michael, M.D., '70
New York
Gastritis
Wells, F. G., M.D., '73
New Jersey
Faculty
Pneumonia
Wenger, Daniel W. '52
Mechanicsburg, Pennsylvania
Dr. David Ecker
Wengert, J. W., Honorary M.D., '70
Wenzell, John, M.D., '65
Philadelphia
Werder, W. E., M.D., '78
Ohio
Dr. Emmerson
Emphysema
West, George M., M.D., '75
New York
Dr. True
Typhoid Fever
Westcott, J. H., M.D., '73
New York
Dr. Wistar
Bright's Disease
Weyl, William F., M.D., '72
Pennsylvania
Dr. Galloway
Electricity
White, (M.D.), Honorary M.D., '66
Scotland
White, (M.D.), M.D., '79
New Jersey
Dr. Downs
Catarrh
White, David, M.D., '73
Ohio
Dr. Milner
Fractures
White, James W., M.D., '77
Tennessee
Dr. Buchanan
Syphilis
White, N., M.D., '79
New York
Dr. Buchanan
Metritis
White, Thomas G., M.D., '69
Whitehouse, T. G., M.D., '68
Whitney, E. B., M.D., '73
Georgia
Dr. Simon
Spinal Irritation
Whitney, I. J., M.D., '77
New York
Dr. Bland
Typhoid
Wiard, William, M.D., '67
Connecticut
Wiggins, J. H., M.D., '69
Wiggins, Thomas, M.D., '69
Wilde, C., M.D., '74
Pennsylvania
Dr. Querner
Cholera
Wildley, Jonathan B. '52
Philadelphia
Dr. Joseph Sites
Wiley, J. W., M.D., '79
Mississippi
Dr. Burchell
Bright's Disease
Wiley, Marvin L., M.D., '78
New York
Dr. Lilly
Diseases of Women
Wilkinson, S. S., M.D., '68
Willdey, J. B., M.D., '54
Philadelphia
Willey, John A., M.D., '63
Williams, L. D., M.D., '70
Michigan
Tabes Mesenterica
Williams, Oliver G., M.D., '73
Michigan
Fistula
Dr. French
Williamson, Matthew, M.D., '69
Williamson, Peter, M.D., '68
Willson, Job, M.D., '67
Canada West
Wilson, H. H., M.D., '74
Michigan
Dr. Bloom
Peritonitis
Wilson, James, Honorary M.D., '71
New York
Windsor, William, M.D., '74
England
Dr. Jones
Dentition
Wishart, L. A. C., M.D., '63
Wistar, Louis, M.D., '66
New Hampshire

Wittkamp, J. V., M.D., '70
Pennsylvania
Spinal Irritation
Wittkamp, L. M., M.D., '69
Woland, W. H. H., M.D., '72
Pennsylvania
Dr. Traner
Digestion
Wood, Horace D. G., M.D., '79
Indiana
Dr. Beauford
Nephritis
Wood, John, M.D., '68
Wood, Thomas P., M.D., '78
Pennsylvania
Dr. Hunton
Epilepsy
Woodfalk, James H. '60
Alabama
Woodhead, J. T., Honorary M.D., '77
England
Woodvine, D. G., M.D., '58
New York
Woodward, W. W. '60
New Hampshire
Woodworth, W. F., M.D., '75
Illinois
Dr. Buchanan
Fever
Woolhiser, O. T., M.D., '69
Woorrell, John P., M.D., '66
Pennsylvania
Worthington, Thomas '60
Tennessee
Wright, Benjamin, M.D., '68
Wright, C. M. '56
Wright, James R., M.D., '73
Michigan
Dr. Ayres
Gastritis
Wright, J. H., Honorary M.D., '69
Ohio
Wright, Joseph W., M.D., '78
New York
Dr. Scranton
Ferri
Wright, Robert S., '60
California
Wright, William, '52
Philadelphia
Dr. Thomas Cooke
Wyckoff, W. W., '60
New Jersey

Yeat(e)s, W. A., M.D., '72
England
Dr. Bend
Bronchitis
Young, H., M.D., '74
New York
Dr. Mason
Pleurisy
Young, Wesley, '60
New York
Young, W., Honorary M.D., '70

PRIZE WINNERS

1865

Burns, Robert, (M.D.)
Carleton Place, Canada West
For the best surgical dissection of the thigh and leg.
Prize: Diploma of the Alumni, with a copy of Hammond's Physiological Essays.
Kay, John P., (M.D.)
Farquhar, Canada West
For the best surgical dissection of the arm and forearm.
Prize: Diploma of the Alumni, with a copy of Hammond's Essays on Diseases of the U. S. A.

1870

Bedortha, B. N.	Kenney, M. B.
Brownson, M. S.	McLean, D.
Eastland, J. S.	Stevenson, M.
Harrel, J. C.	Thompson, B.

1874

Adams, Hon. W. L., (M.A., LL.D., M.D.)
Portland, Oregon
Infantile Mortality
Bryan, James, (M.D.)
New York
Degeneration of American Youth
Cobb, Charles H., (M.D.)
Boston
Pulmonary Consumption
Hobensack, J. B., (M.D.)
Philadelphia
Venereal Disease

*1875**

Daffin, William H., (M.D.)
Pennsylvania
Endemic Fevers
Livingston, Jeremiah K., (M.D., PH.D.)
Martinsburg, Pennsylvania
Curability of Pulmonary Consumption

* Beginning in 1875, any Eclectic physician in the United States, Canada or Great Britain could compete for a prize, by submitting an essay.

McCollom, A.
New York
Dentition
Russell, A. W.
Canada
Arrest of Foeticide
Slack, Watson
Missouri
Venereal Disease
Siggins, J. J., (M.D.)
Pennsylvania
Veratum Viride
Tund, N. I.
Illinois
Ovarian Disease

1877

"For distinguished conduct, high graded merit and for rapid advancement in medical science."
Banton, J. F.
New York
Folz, F. F.
Philadelphia
Walker, G. B.
Illinois

1878

Dr. Alcott
Alumni Association Prize
Crider, J. Jackson, (M.D.) Gold Medal
Ottumwa, Iowa
New Cure
Dr. Gibson
Alumni Association Prize
Dr. Hampton
Alumni Association Prize
Dr. Hawley
Alumni Association Prize
Hunter, G. F., (M.D.), Gold Medal
Clyde, Michigan
Pulmonary Consumption
Dr. Moore
Alumni Association Prize
Dr. Sargent
Alumni Association Prize
Wooster, James M. Crismore (M.D.), Gold Medal
Ohio
Gynaecology

1879

Brickner, M. F.
Connecticut
Essay
Donaldson, E. P.
Michigan
Essay
Hobbs, H. C.
Indiana
Essay
Kilburn, —— (M.D.), Gold Medal
Vermont
Dissections in Surgical Anatomy
Kingsford, William, (M.D.), Gold Medal
Chelsea, Massachusetts
Gynaecology
Livingston, C. E., Gold Medal
Toledo, Ohio
Germs
Longacre, —— (M.D.), Gold Medal
New Jersey
Dissections in Surgical Anatomy
Tiffany, George
Connecticut
Essay

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Transplantation Immunity and the Maternal-Fetal Relationship[1]

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I. INTRODUCTION

PROBABLY no discipline in biological science has enjoyed a more explosive expansion of interest, scope and effort, and made greater progress in the past decade than that concerned with immunological aspects of tissue transplantation. Apart from its clinical application, which in itself provides a powerful impetus, the importance and appeal of the subject derives from its remarkable interdisciplinary nature—it represents a zone of fusion between immunology, genetics and embryology, with lesser contributions from other biological sciences.

Being regretfully aware of the impossibility of giving, even in outline, a meaningful general account of the subject as it now stands, I've selected one important aspect—*The Maternal-Fetal Relationship*—as the subject of this Alvarenga Lecture. However, before introducing this topic I must mention very briefly and in a rather disconnected manner a few pertinent general principles of transplantation immunology.

The view that sensitivity to vascularized solid tissue homografts is a form of delayed allergy, mediated by immunologically activated mononuclear cells of the lymphocytic series (small lymphocytes, in fact) rather than by humoral antibodies, has been greatly strengthened by several recent findings (see 13). However, it must be conceded that there are still some observations which are exceedingly difficult to reconcile with it (13).

The early studies on the phenomenon of immunological tolerance suggested that ability to become tolerant following exposure to living homologous tissue cells was restricted to very young animals (7). However, more recent investigations indicate that an essentially similar state of specific unresponsiveness can be induced in animals of *all* ages by appropriate tactics of antigen administration. Usually, though, the production of this unresponsiveness becomes more difficult as the host matures or grows up and as the immunogenetic disparity between the donor and the host is increased (13). The only meaningful distinction that can now be drawn between tolerance, as induced in young animals on the one hand, and in adult animals on the other, seems to be an operational or quantitative one.

Finally, where either solid tissue or "cellular" homografts include immunologically competent cells, not only do we have to consider

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the reactivity of the host against the graft, but also *that of the graft against the host*, since under appropriate conditions the latter can have dramatic or even lethal consequences (5, 79, 96).

II. THE FETUS QUÂ HOMOGRAFT

Confrontation of mammals with tissues or cells of alien immunogenetic constitution is not restricted to the professional activities of clinicians and experimental biologists. Every pregnancy in an outbred population represents an extremely intimate *natural* parabiotic union and exposure of the mother to fetal tissues which she is at least potentially capable of reacting against. This follows from the fact that the fetus inherits from its father a variable number of isoantigens that are foreign to the mother.

Why is it, therefore, that unlike homografts transplanted to nearly every site in the body, naturally implanted embryos normally fail to provoke an effective sensitization on the part of their mothers? Some idea of the magnitude of the homograft problem posed by pregnancy may be gained from the fact that female mice and rats can easily deliver many times their own weight of babies during their reproductive life-span.

The occurrence of hemolytic disease of the newborn as a complication of pregnancy in man and certain domestic animals is sufficient evidence that the danger of maternal isoimmunization is a very real one. Here, sensitization is provoked by certain foreign blood group substances present on the erythrocytes of the fetus, and the disease results from destruction of fetal red cells by transferred maternal antibody.

With the exception of parthenogenesis, the only situation where a fetus cannot confront its mother with any foreign antigens is when its mother and father are members of the *same* inbred or isogenic strain, so that it receives identical genetic endowments from both.

The intensity of the reaction which a homograft can provoke—usually measured in terms of the survival time of the graft—is directly related to the antigenic (or genetic) disparity between donor and recipient. When fertilized eggs resulting from a mating between one pair of individuals are transferred to the uterus of a genetically unrelated third party, the resulting *experimental foster pregnancy*, as Willis (110) has aptly termed it, represents an immunogenetic relationship between mother and embryo similar in all respects to that which occurs when homografts are exchanged between unrelated individuals.

The first foster pregnancy experiment was performed in 1890 by Heape (44), who transferred two fertilized eggs, derived from mating a pair of Angora rabbits, to the fallopian tube of a Belgian hare which had just previously been mated to a buck of her own strain. In due course this experimentally cuckolded mother gave birth to 6 young—4 of Belgian hare type and two that were in all respects Angoras. Subsequent work has confirmed that, provided certain technical and endocrinological requirements are satisfied, normal offspring will develop from transferred early zygotes in rabbits (24), mice (65), rats (78), cattle (106) and sheep (2, 103) with no overt immunological complications.

When the donor and recipient of a graft are members of *different* species the barriers of incompatibility are nearly always much more formidable than when they belong to the same species. Tissue *heterografts* usually fail to achieve more than a feeble union with their hosts and are destroyed much more rapidly than homografts. A humoral immunity, rather than a cellular one, is believed to be responsible for their destruction. Hence the pregnancies resulting in births of healthy interspecific hybrids, following matings between horses and donkeys; zebras and donkeys; sheep and goats; lions and tigers; leopards and tigers; cattle, bison and yak in different combinations; and Kodiak and polar bears, etc. (see 38) represent more dramatic violations of the so-called "laws of transplantation" than interspecific pregnancies.

Hypotheses Advanced to Account for the Success of Fetal Homografts

The apparently unqualified success of the fetus as a homograft has been recognized as one of the major unsolved problems of transplantation immunology for more than 40 years. Let us therefore consider in some detail the experimental evidence bearing upon each of the more important hypotheses which have been advanced to account for this.

i) *The Fetus is Antigenically Immature.* The very plausible idea that the mother tolerates the growth of her embryo simply because the latter does not develop its isoantigenic individuality until relatively late in its ontogeny was favored by Little (62) in 1924. However, so far as the fetus *per se* is concerned (I shall deal with its placental components later) this explanation was decisively refuted when it was recently established that transplantation antigens appear *very early* in embryonic life (see 13). Although they hinted that this was the case, early findings that minced up embryonic tissue homografts, implanted into adult hosts, elicited sensitivity against subsequent test grafts of tumor or adult skin of similar alien genetic constitution were inconclusive. The experiments failed to exclude the possibility of antigenic maturation on the part of the grafts in the hosts upon which resistance was conferred (see 67).

However, the new studies have minimized or circumvented this possibility in various ways, such as: i) restriction of the time available for cells to sensitize their hosts; ii) evaluation of the antigenicity of embryonic cells in terms of their ability to confer tolerance upon very young hosts; or iii) by precluding further differentiation by X-irradiation. The findings have confirmed that effective transplantation antigens *are* present very early in development in both birds and mammals—by the 4th day of embryonic life in the chicken, and in mice certainly by the 12th day and probably much sooner (see 13).

Toolan's (101) report that orthotopic skin homografts from very young rabbit embryos sometimes long outlive similar grafts from adult donors is not necessarily inconsistent with this general conclusion. Although we have been unable to obtain similar findings in rabbits, Dr. Silvers and I find that skin homografts from near-term or early post-natal Syrian hamsters have a much greater life-expectancy than grafts from adult donors (14). Indeed, we find that a small proportion of these grafts survive indefinitely. The same principle seems to apply in the mouse too, at least so far as one weak histo-incompatibility factor is concerned. Within the C57BL/6 strain, where males have a weak transplantation antigen determined by a locus on the Y chromosome that is lacking in females (see 10), isografts of adult male skin on females are consistently rejected within about 30 days whereas similar grafts from *infant* donors are permanently accepted by about 50% of their female hosts (15).

Causal analyses of this extended longevity of perinatal skin homografts in hamsters and mice show that it cannot be ascribed to a lack of transplantation antigens in the tissues involved, since they are fully susceptible to an existing state of sensitivity at the time of transplantation, or to one elicited by proxy soon afterwards. Although these infant grafts rapidly acquire a rich blood supply, peculiar properties of their connective tissue matrix seem to prevent the exposure of their hosts to effective amounts of antigenic material. Indeed, there is evidence that prolonged acceptance of these grafts may actually result in a *weakening* of the host's capacity to react against the foreign antigens concerned (14, 15). These findings are, therefore, in no sense to be regarded as inconsistent with the early appearance of transplantation antigens in ontogeny, though they do have implications for materno-fetal relationships, as we shall see later (Section III, Part i).

So far as the *extra*-embryonic tissues of an embryo are concerned it must be mentioned at this stage that rather crude tests have been carried out in which either dissociated or intact placental tissue from F_1 hybrid mouse fetuses has been inoculated into normal mice belong-

ing to the maternal strain (95, 102). Although the observed sensitization of the hosts in respect of subsequent paternal-strain skin homografts suggests the presence of paternally inherited, foreign, transplantation antigens in the placenta, the experimental design fails to exclude the antigenic maturation factor we have already considered, nor does it shed any light on the identity of the antigenically effective components. Fetal leucocytes may have been largely responsible for the sensitivities observed (102). Evidence of the accelerated destruction of placental tissue homografts implanted into *pre-sensitized* maternal strain hosts (95) is particularly important, however, since it establishes the susceptibility of at least some components of this composite organ to transplantation immunity. It is very difficult to reconcile these findings with Hašková's (42, 43) claim that even relatively large dosages of F_1 hybrid mouse placentae are a practically ineffective source of paternal strain transplantation antigens yet a highly effective source of maternal antigens, implying that the paternally inherited antigens in the fetal part of the placentae are inadequately expressed.

ii) *The Immunological Reactivity of the Mother is Weakened during Pregnancy.* It is fairly well established that decreased resistance to certain infections is associated with pregnancy. Partly on this basis and the chance observation of a prolongation of survival of skin homografts transplanted to a female rabbit on the 19th day of pregnancy (8), the hypothesis was tentatively advanced by Medawar (67) that the immunological capacity of the mother might undergo some form of physiological change which would protect the fetus against the dangers of immunizing its mother.

The fact that the production of adrenocortical hormones, some of which (especially cortisone [68]) are known to impair the development of sensitivity to homografts as well as to other types of antigen (36), is increased during pregnancy, lent some support to this thesis. Direct evidence in its favor was Heslop, Krohn and Sparrow's (47) demonstration that skin homografts transplanted to rabbits that were about three weeks pregnant lived *almost twice as long* as grafts transplanted earlier or later in pregnancy, or to non-pregnant animals. These findings were interpreted as indicative that the peak of enhanced steroid secretion probably occurred during the latter part of pregnancy. However, neither pregnancy nor treatment with steroid hormones will significantly weaken the level of a *pre-existing* homograft sensitivity in rabbits (47). Furthermore, in neither mice, nor cattle (with a gestation period of about 280 days), has pregnancy been found to have any perceptible influence on the development of sensitivity to skin homografts (9, 69). At best, therefore, the increased corticosteroid production associated with pregnancy—to which both fetus and placenta probably contribute—can only be regarded as affording a weak ancillary mechanism for preventing the development of maternal iso-immunity during pregnancy in a few species.

iii) *The Uterus is an Immunologically Privileged Site.* The existence of "privileged" or favored sites in the body in which tissue grafts of alien origin may acquire a blood supply and thrive for a long time, apparently exempted from the familiar immunologically procured rejection process, is well established. Familiar examples are the brain, the anterior chamber of the eye, and the cheek pouch of the Syrian hamster (see 11, 66). Besides these, there are fairly good grounds for suspecting that certain subcutaneous fat pads (55) and the testis (88) may have similar properties. The uniqueness of each of these sites seems to depend upon the absence of the appropriate physiological pathway for the evocation of an immunological response—i.e., none of them provides the graft with a lymphatic drainage. Nevertheless, for each of the privileged sites mentioned the efferent pathway for the immunological reflex, constituted by blood vessels, is fully developed, so that homografts implanted in these locations are fully susceptible either to a pre-existing or to a subsequently induced sensitization.

The only privileged sites in which grafts can

neither elicit sensitivity nor be affected by a state of sensitivity are the anterior chamber of the eye, the substantia propria of the cornea (6, 66) and within the lens capsule. Of course, the condition for their enjoyment of this absolute privilege is that they must *not* become vascularized. Needless to say, survival under these conditions, like those obtained when tiny grafts are maintained *in vivo* but sequestered in cell-impermeable Millipore diffusion chambers, entails considerable curtailment of a tissue's normal biological activities.

Let us therefore examine the possibility that some type of privileged status of the uterine environment may underlie the success of fetuses as homografts. Several independent lines of evidence bear upon this hypothesis:

Clinical evidence derives from investigations on the phenomenon of ectopic pregnancy. Here non-uterine tissues, such as fallopian tubes, the pelvic ileum, the rectum, and lateral and posterior aspects of the pelvic peritoneum may form the implantation sites of the fertilized egg and subsequently the site of attachment of the embryo's placenta. Attachment at these aberrant sites does not necessarily prejudice normal development of the fetus for a considerable period, and even to term in a few cases (49, 98, 100, 104, 107). When fetal death occurs under these circumstances, there seem to be no grounds for implicating homograft reactivity on the part of the mother as the causative agent.

Although there have been very few reports of naturally occurring ectopic pregnancies in mammals other than man (33), extra-uterine pregnancies have been procured experimentally in various ways. Nicholas (77) ligated and separated the uterine horns of non-inbred female rats early in gestation so that the segmenting eggs were extruded into the abdominal cavities. Here the eggs occasionally became attached to the mesenteries, survived and developed normally into viable fetuses. He also demonstrated that 9- and 10-day-old embryos could develop normally after transplantation to pockets prepared in the caecum. In the mouse, Kirby (52) has shown that blastocysts transferred beneath the renal capsules of genetically alien hosts may develop into normal embryos.

Schlesinger (91) has produced decisive evidence that the uterus is not endowed with distinctive immunological properties that make it a favorable site for implantation of an alien-antigen bearing embryo. He studied the fate of strain specific tumors implanted into the uterine horns of mice and rats. Provided that the tumor and its female host were of similar genetic constitution, the grafts grew successfully; but when homologous tumor grafts were employed only transitory growth occurred. Furthermore, intra-uterine tumor homografts underwent accelerated destruction in specifically pre-sensitized animals, irrespective of whether the latter were non-pregnant, pseudopregnant, or pregnant in one uterine horn.

Thus there seems to be nothing that is immunologically peculiar or distinctive about the uterine environment: transplantation immunity can both be evoked and expressed here in a normal manner. All the evidence we have just considered indicates that whatever it is that protects the fetus either from sensitizing its mother, or from the fulfillment of a state of sensitization, must be associated with components of the *fetus* itself.

iv) *There is a Physiological Barrier Between Mother and Fetus.* One of the most provocative properties of the fetus, from the immunological standpoint, is its apparent *complete* indifference to a state of sensitivity in the mother specifically directed at its own, foreign, paternally inherited transplantation antigens. This paradoxical situation is expressed in its most dramatic form in species having placentae in which the maternal blood, which bears the cellular mediators of homograft destruction, is directly and continuously in contact with the fetal trophoblast. Many attempts have been made to prejudice either the incidence or the outcome of *heterospecific* pregnancies (i.e., pregnancies resulting from mating genetically dissimilar parents) in mice (73, 41, 69), rats

(111) and rabbits (47, 111) by sensitizing the mothers prior to mating, or during pregnancy, with homografts of the father's genotype. None of these has met with the slightest hint of success.

Likewise Lanman, Dinerstein and Fikrig (56) were unable to influence the successful outcome of foster pregnancies in rabbits either by pre-sensitization of the foster mother with skin grafts from both the father and the mother of the transferred ova, or by re-exposing her to homografts from these donors at the time of egg transfer, or at mid-pregnancy. This evidence is particularly important since it renders implausible any attempt to attribute failure of maternal sensitization to a postulated *maternal* origin of the trophoblastic component of the placenta (37), or to the failure of paternally inherited antigens to express themselves in the fetal components of the placenta (42). It need hardly be added that embryological evidence of the fetal origin of the trophoblast is very strong (17) and has recently been strengthened by studies on heterotopically transplanted fertilized ova (see below).

The only reasonable hypothesis capable of accounting for all the findings I've presented so far is that mother and fetus are completely separated by an anatomical barrier; one that not only prevents sensitization of the mother in respect of fetal transplantation antigens, but also prevents fulfillment of a state of sensitivity established by experimental artifice. It is generally agreed that the principal factor is the *complete* separation of the maternal and fetal blood systems (67). This important anatomical fact was certainly appreciated by William Harvey (108), though its immunological significance was certainly not. However, this is clearly an insufficient explanation in view of the relatively large surface area over which living fetal and maternal tissues are intimately juxtaposed in the placenta. The trophoblast of the fetus constitutes its continuous, unbroken "frontier" component. In mammals with haemochorial placentae, like man and the rabbit, only a very thin layer of trophoblast intervenes between many of the fetal capillaries and the maternal blood in the intervillous spaces.

Circumstantial evidence that normal trophoblast may possess peculiar immunological properties was forthcoming from studies on its malignant derivatives—chorionepitheliomas—in man. It is now generally recognized that most of these highly invasive tumors arise from the chorionic epithelium of the fetus and develop in the mother within a highly variable time interval after termination of the offending gestation (109). These rare tumors metastasize readily via the veins, involving many tissues and organs. Their successful growth is remarkable in view of the fact that they are *homografts* by virtue of their *fetal* origin. Several ingenious attempts have been made to treat these tumors immunologically—by repeatedly injecting the patients with leucocyte concentrates, followed by skin grafts, from their husbands (25, 30, 40, 87). Unfortunately, only in one case has fairly convincing evidence been obtained that this caused any regression of metastases (25). In two patients it was discovered that their ability to reject homografts of their husband's skin was greatly impaired, whereas they rejected grafts from unrelated donors with normal vigor (87). None of the mononuclear cellular infiltrations that are almost invariably associated with homograft reactivity have been observed in deposits of these tumors, either in untreated subjects or in those which have received grafts of their husband's skin. On the basis of their findings Hackett and Beech (40) concluded that choriocarcinomata are effectively non-antigenic, exhibiting the same mechanisms or properties of physiological non-antigenicity that exist in normal trophoblast.

However, some important clinical findings hint rather strongly that chorionepitheliomas are not always completely devoid of isoantigenic activity. The well-documented occurrence of spontaneous regressions of tumors originating from the uterus, particularly after removal of the primary growths (4, 109); and the high proportion of complete remissions obtained by treatment of female patients with amethop-

terin, sometimes supplemented with vinca-leukoblastin (46), are consistent with the concept that many patients do indeed develop some degree of sensitivity towards these foreign tumors. However, if isoimmunization does occur, it does not seem to be accompanied by the appearance of humoral antibodies reactive against the husband's blood group factors (92).

Lack of a significant response to chemotherapy on the part of *male* patients suffering from this type of tumor (60) is perfectly consistent with the view that in the female natural isoimmunization and chemotherapy may act synergistically in procuring remissions (46).

Finally, the observation that women respond better to chemotherapy if this is initiated *soon* after the onset of the disease (46) might be indicative that some of these feebly antigenic tumors eventually induce a state of transplantation tolerance in their hosts, so that the response of the latter to chemotherapy becomes no better than that of the genetically tolerant male subjects. This may explain Robinson, et al's (87) interesting finding of severe if not complete impairment of their two patients' reactivity against grafts of their husbands' skin (c.f., 85).

Returning now to our consideration of normal trophoblast: almost unequivocal evidence in support of the hypothesis that this tissue does indeed furnish an immunological protective barrier, or buffer, between mother and fetus has recently been presented by Simmons and Russell (95). They have analyzed the histocompatibility characteristics of mouse placental tissue at various stages of its development. Like other workers, they studied grafts from F_1 hybrid embryos transplanted to recipients of the *maternal* strain. This is important, since, under these circumstances, the accidental inclusion of maternal cells in fetal tissue grafts does not affect the hosts immunologically. They separated the trophoblastic and embryonic portions of 7 day mouse conceptuses and studied the fate of these two components following implantation beneath the renal capsules of maternal strain hosts presensitized in respect of paternal strain antigens. Whereas the embryonic tissue grafts underwent prompt destruction, those of trophoblastic tissue displayed marked proliferative activity on the part of the giant cells, with the formation of typical blood spaces. They survived just as well as if transplanted to genetically compatible hosts.

Further evidence supporting the idea that trophoblast is an ineffective source of transplantation antigens has been forthcoming from studies on fertilized ova or blastocysts transplanted heterotopically beneath the renal capsules or to the spleen (54, 95). In these sites the ova develop into "tumors" of trophoblast giant cells with a life-span of about two weeks in compatible hosts. When F_1 ova were transplanted to normal maternal strain hosts, their life-span was not curtailed and they did not elicit a detectable sensitivity to subsequent grafts of paternal skin, nor was an effective reactivity demonstrable against these cells when fertilized ova were transplanted to specifically pre-sensitized animals (95). Kirby (53) has shown that upwards of 25 per cent of mouse blastocysts transplanted to *rat* kidneys likewise produce flourishing trophoblast which invades and phagocytoses the surrounding tissue, closely resembling its activity in a host of it *own* species. However, when a 6½ day old mouse *embryo*, divested of its trophoblast, was similarly transplanted it provoked a massive cellular response within the same time interval.

At present nothing is known about the basis of the apparent greatly enfeebled or non-antigenicity of trophoblast cells. Are the antigens produced but not released? The only other known type of mammalian cell which also behaves as if it lacks transplantation antigens is the erythrocyte. Further discussion of this important issue would be pointless since we still have no knowledge of the physical form or manner in which these antigens are released from homografts of other tissues, or even whether they have to escape from cells in order to sensitize the host.

In view of the potential experimental usefulness of chorioepitheliomas for shedding light on this sort of problem it is unfortunate

that these tumors are either extremely rare, or perhaps never occur, in laboratory mammals (97, 109).

Unsuccessful attempts have been made to detect "antibodies"—presumably organ- or tissue-specific antibodies—to placenta during pregnancy. Postulating that if such antibodies are formed they might easily be absorbed by the trophoblastic tissue in the placenta, Hulka, Hsu and Beiser (48) tested post partum human sera. Evidence of specific binding of fluorescein-tagged maternal globulin by the syncytiotrophoblastic cytoplasm was interpreted by them as indicative of the presence of antitrophoblastic antibodies.

It may be recalled that Thomas (99) has tentatively suggested that degenerative changes occurring in normal placentae as gestation proceeds, might be ascribed to sensitization of the mother to a special *organ-specific* antigen, possibly appearing rather late in the maturation of this tissue. Parturition may represent an immunological rejection, analogous to that of a homograft. Of course, as Thomas was careful to point out, one cannot implicate transplantation antigens in such a hypothesis, otherwise it would fail to account for placental separation in isogenic strains.

It is hardly necessary to point out that one cannot sustain any hypothesis that ascribes the invulnerability of the fetus to a state of specific sensitization on the part of its mother to some form of specific antibody- or resistance-absorbing activity on the part of its trophoblast. If this occurred both normal reactivity and pre-existing sensitivity against paternal strain skin homografts should be demonstrably *weakened* in female mice bearing F_1 fetuses, and this is not the case.

III. EXCHANGE OF CELLS BETWEEN MOTHER AND FETUS AND ITS CONSEQUENCES

It is now generally recognized that the normal placenta does not constitute a perfect cell-impermeable barrier and that some exchange of cells between mother and fetus must be regarded as a fairly common occurrence in man, and probably in other mammals too.

Since the feto-maternal passage of red cells was first postulated to account for Rh sensitization, numerous independent investigations, using different "markers", have confirmed that passage of fetal red cells into the maternal circulation occurs in 10-20% of normal pregnancies (26, 35, 57, 64, 112, 113). Most estimates of the amount of fetal blood present in the maternal circulation range from 0.1–3.0 ml., though in certain conditions, such as neonatal anemia, much larger volumes of blood may enter the mother (81). Likewise, evidence is accumulating that passage of maternal erythrocytes into the fetal circulation is probably a common event (32, 57, 70). Here, too, massive amounts of blood may sometimes be transferred—e.g., in cases of neonatal plethora (1, 71).

It is difficult to conceive how red cells could be exchanged without accompanying leucocytes and platelets and evidence is now accumulating that this actually happens (28).

Exactly when and how these exchanges of blood cells come about remain unknown. Apart from the operation of physical factors during labor, it seems reasonable to assume that minor breaks in the placental barrier, leading to small hemorrhages, must occur frequently during pregnancy, as suggested by evidence of early cell exchanges.

Another type of tissue homograft of fetal origin which frequently, if not invariably, gains access to the blood stream of pregnant women as a normal process from the 18th week of gestation onwards is syncytiotrophoblast (17, 31, 89). Little is known about the transported trophoblast fragments except that they appear not to proliferate (80) and, being highly susceptible to the action of proteolytic enzymes *in vitro*, they probably undergo rapid destruction *in vivo* (31). However, the possibility must be borne in mind that they may furnish a weak antigenic stimulus. So far there is no evidence that natural deportation of trophoblast occurs in any species but man (80).

Let us now consider the possible or suspected consequence of these materno-fetal exchanges of cellular homografts from the point of view of transplantation immunology. Red cells will be excluded from this discussion since, at least in mammals, effective transplantation antigens do not appear to be associated with them.

i) *Influence of Passage of Fetal Cells into the Mother.* In cattle there is suggestive evidence that pregnancy sometimes results in sensitization of the dam in respect of her offspring's cells (9). There is also some basis for believing that habitual spontaneous abortion in women may be associated with the development of sensitivity to grafts of their husband's skin (3). In an extensive investigation carried out in mice, Medawar and Sparrow (69) could find no evidence of the development of sensitivity in CBA strain females, following repeated pregnancies by A strain males. On the other hand, with the CBA male × A strain female combination, repeated heterospecific pregnancies did result in prolongation of the lives of CBA strain skin homografts. However, this prolongation was not entirely attributable to heterospecific pregnancies, or indeed to pregnancy at all, since some prolongation of homograft survival was observed in A strain females repeatedly pregnant by A strain males, and in elderly virgins of similar age.

Breyere and Barrett (20, 21) have carried out essentially similar experiments with DBA/2 and BALB/c mouse strains which, although differing with respect to about 13 histocompatibility factors, are similar at the important H-2 locus. Besides confirming that heterospecific matings did not lead to sensitization, this work established that exactly the opposite modality of response may occur, leading to a long-lasting specific *weakening* of reactivity against parental strain homografts, with some strain combinations. Specifically, these workers demonstrated that the ability of BALB/c mice to reject skin or tumor homografts from DBA/2 strain donors is progressively impaired as a consequence of pregnancies by males of this strain. With skin homografts the incidence and degree of impairment of host reactivity increased up to a point with parity, but never became complete (21). Some evidence was obtained that even a pre-existing sensitivity could be weakened by heterospecific pregnancies. With the C3H male × BALB/c female combination, where there *is* histo-incompatibility at the H-2 locus, repeated heterospecific pregnancies resulted in abrogation of the normal resistance to a C3H plasma cell tumor (22). It must be pointed out that tumor test grafts are more sensitive indicators of feeble degrees of tolerance than the more exacting skin homografts.

Breyere and Burhoe's (23) analyses indicate that incompleteness of the parity-induced tolerance of DBA/2 skin homografts in BALB/c females probably results from complete and permanent tolerance to some paternal strain antigens, and to unchanged or only partially suppressed reactivity to others—probably the most important or stronger antigenic factors involved.

Evidence that, at least with this strain combination, the antigens responsible for eliciting maternal tolerance originate from the *conceptus* prior to parturition includes: a) The demonstration that heterospecific matings of BALB/c females whose uterine horns had been ligated, or whose ovaries had been transplanted subcutaneously, failed to produce tolerance in respect of subsequently inoculated DBA/2 tumor homografts; and b) the finding that, despite removal near term of the gravid uterine horns from BALB/c females pregnant by DBA/2 males, evidence of tolerance induction was still obtained (84).

The histo-incompatibility system in which the influence of parity has the most striking effect is that determined by the relatively weak Y chromosome factor in C57BL/6 mice (see 13). Here practically every virgin female will reject a male skin isograft within 15–50 days (median survival time about 27 days), irrespective of her age at the time of grafting. However, with increasing parity by males of their own strain an increasing proportion of

TABLE 1

INDUCTION OF TOLERANCE OF MALE SKIN ISOGRAFTS IN C57BL/6 FEMALE MICE THROUGH REPEATED PREGNANCIES BY C57BL/6 MALES

Age at Challenge with Male Skin	No. of Litters Born	No. of Females Tested	No. of Females which Accepted Male Skin Grafts for at least 100 Days
(days)			
320	0	17*	0
150–200	1	10	0
170–330	5–7	17	11 (65%)
235–260	8–11	7	7 (100%)

* A panel of elderly virgin females to provide controls. (Unpublished data of Billingham, Silvers and Wilson)

the females become incapable of rejecting male skin isografts (85). In our experience no female which has given birth to eight or more litters is able to reject its test graft during a 100 day observation period (Table 1). There is some evidence that even repeated insemination of naturally sterile or artificially sterilized female C57 mice by isogenic males has a slight weakening effect on their reactivity towards male skin isografts (59, 85). This suggests that Y antigenic material present in semen must somehow leave the genital tract and gain access to the maternal tissues.

There is little at present to indicate the manner in which this highly specific, pregnancy-induced state of transplantation tolerance comes into being. It does not appear to be a manifestation of the phenomenon of immunological enhancement (51, 84). In mice it seems to result from repeated episodes of protracted administration of antigen—almost certainly in cellular form—in very low dosages. Where strong antigens are involved the phenomenon is of trivial significance, if it occurs at all. It is conceivable that in mammals with longer gestation periods more impressive results might be obtainable. Certainly it is well worth determining whether repeated normal pregnancies impair the reactivity of women towards their husbands' transplantation antigens. If applicable to man, Brent and Medawar's (19) indirect test procedure, so effective in guinea pigs, might be ideal for this purpose. It would entail testing the reactivity of viable maternal blood lymphocytes injected intradermally into the women's husbands.

In the light of the evidence discussed it would be fatuous to represent maternal tolerance as a natural protective mechanism against the risk of sensitization during pregnancy (see 31), since it does not appear in early pregnancies nor does it apply to strong transplantation antigens. Indeed the success of both experimental foster- and normal pregnancies in specifically pre-sensitized female rabbits makes such a hypothesis untenable.

Relatively high dosages of homologous living cells must be injected intravenously into *adult* mice in order to induce tolerance of skin homografts even in situations which do not involve major histocompatibility differences (13). Thus the influence of repeated heterospecific pregnancies is particularly striking since it seems unlikely that the aggregate dosage of cells that gain access to the mother from *all* of her offspring can be very large. In man it would be exceedingly interesting to know whether the normal migration of trophoblast into the maternal blood stream influences the reactivity of the host against subsequent grafts of her offsprings' or her husband's skin.

Cognate phenomena may be: 1) The specific prolongation of survival of skin homografts in adult rabbits previously injected intravenously with relatively low dosages (10–20 million cells) of viable suspensions of donor epidermal cells or leucocytes (16); 2) The prolongation of survival of body skin homografts on Syrian hamsters which have long accepted homografts of donor strain cheek pouch skin (14); and 3) The apparent "conditioning" of mouse and rat hosts to accept donor skin homografts as a consequence of having long borne homografts of endocrine tissue which they were incapable of rejecting (see 61). This phenomenon seems to apply only where relatively weak histoincompatibilities are involved. In none of these phenomena can the amount of antigenic material which impinges upon the host be very great, and in phenomena (2) and (3) it may be

very unwise to assume that the tolerance-conferring stimulus which leaves the grafts is cell-bound.

The examples just cited are part of an increasing body of circumstantial evidence of a rather empirical nature sustaining our belief that chronic exposure of adult animals to very low dosages of transplantation antigens may lead to a specific *weakening* of their ability to respond to tissue homografts of the same alien genetic origin. The intravenous route of administration of these antigens which, in some species including the rabbit and probably man, is the least effective route from the point of view of sensitization by means of homologous cell suspensions, seems to be the most effective for bringing about this weakening of response. In pregnancy, practically the only route of access of fetal antigenic material to the mother is that afforded by the venous sinuses of the placenta.

ii) *Influence of Passage of Maternal Cells into the Fetus.* Let us consider possible consequences of the accidental incorporation of maternal cells into the fetus. The most obvious possibility, of course, is that if sufficient maternal cells (leucocytes are the most favorable candidates) gain access to the fetal circulation early enough some degree of tolerance of the foreign maternal transplantation antigens will be induced. Studies have been made to find out whether tolerance is ever evoked in this manner in mice, guinea pigs, rabbits, and cattle. With the rabbits and cattle the survival times of maternal homografts on their offspring were simply compared with those of homografts transplanted between unrelated individuals of the same species (7). In guinea pigs some of the litters from a large number of matings between outbred parents were challenged with homografts of maternal skin and others with homografts of paternal skin and the results compared (7). With mice, where different inbred strains were available, experiments of more sophisticated design have been carried out (7, 63). Jones and Krohn (50) found that even when tolerant adult A strain female mice, bearing functional orthotopic CBA strain ovaries, were mated with CBA strain males and subsequently bore normal CBA offspring, none of the latter gave any evidence of being tolerant of A strain skin homografts despite gestation in an A strain milieu. Likewise, Billingham and Silvers (10) found that C57BL/6 female mice that were isologous male lymphoid cell chimeras, as a consequence of inoculation at birth with high dosages of isologous male spleen cells, when mated with C57 males gave birth to females which displayed normal reactivity to male skin isografts. With this system it is known that as few as 10,000 isologous male leucocytes injected intravenously into newborn females are sufficient to induce tolerance in 25% of the subjects. Only in guinea pigs has suggestive evidence been obtained that tolerance may very rarely be acquired in this manner (7).

One shortcoming of most of the work cited above is that the test for maternally induced tolerance—challenge with maternal skin when the offspring have grown up—may have been too exacting to reveal whether transient feeble degrees of tolerance were in fact induced.

My colleagues and I are re-investigating this possibility in rats using the following experimental design (see Fig. 1). F_1 hybrid hosts, produced by mating B.N. and Lewis strain parents, are given orthotopic Lewis strain ovarian grafts which, of course, are permanently accepted. These animals are subsequently mated with Lewis males, to produce offspring of Lewis genotype which, having developed in an F_1 uterine environment, may have been naturally exposed to B.N. antigens through infiltration of F_1 cells. Instead of waiting until these animals grow up before challenging with B.N. skin, we test graft when they are 3 days old, since the reactivity of the Lewis rat to B.N. skin homografts is fully developed by this time. Some idea of the sensitivity of this test system may be gained from the fact that as few as 1 million bone marrow cells injected at birth induce a detectable level of tolerance (12). If test grafting is delayed until the animals are about 60 days old the minimal dosage of marrow cells re-

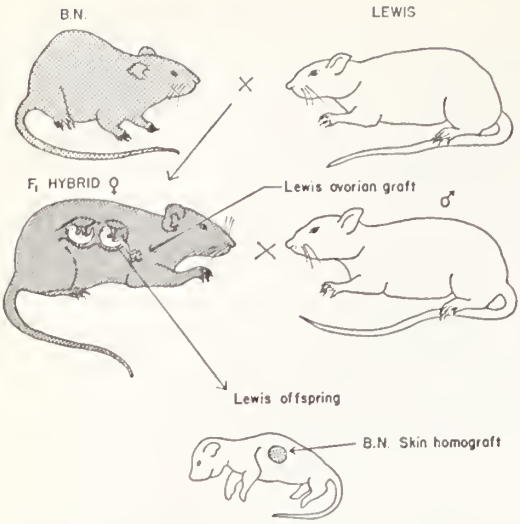

FIG. 1. Test for maternally induced tolerance. Functional Lewis strain ovarian grafts are transplanted orthotopically to F_1 (B.N. × Lewis) female hosts. These animals are then mated with Lewis males so that Lewis strain fetuses develop within their uteri. The offspring are challenged 3 days after birth with B.N. strain skin homografts to determine whether exposure to B.N. strain antigens during gestation in the F_1 uterine milieu has resulted in the induction of tolerance.

quired to produce a detectable level of tolerance is more than 5 million.

So far as man is concerned, Peer and his associates (82, 83) have claimed that children may sometimes accept skin homografts from their mothers for much longer periods than they will accept paternal strain grafts; and that a few mothers long accept grafts of their offsprings' skin. Most of their tests involved exchanges of small discs of auricular skin. In view of the potential clinical significance of these findings it is surprising that they still await independent confirmation, preferably with tests designed to exclude the rather remote possibility that there may be something peculiar about auricular skin or its environment.

The Passage of Malignant Cells into the Fetus. Unlike the infiltration of the fetus by normal maternal cells, which will go undetected unless it has immunological consequences, such as the induction of tolerance, or causation of *runt disease* (see below), infiltration and successful establishment of *malignant* cells of maternal origin is unlikely to escape detection. Only *very* rarely do cancer cells present in the blood stream or in uterine metastases of pregnant women suffering from malignant disease become established in their offspring to the point of *overt* proliferation (86, 105). Rather surprisingly, although maternal-fetal transmission of hematopoietic malignant neoplasms is exceedingly rare (29), there are at least 4 cases in which melanomatous tumor cells appear to have crossed the placental barrier, initiating tumors in the tissues of the child (7).

Studies on mice indicate that only a feeble degree of tolerance may have been required to enable these tumor homografts to become permanently established. Although systemic dissemination of inoculated cells is known to be desirable for bringing about tolerance, it is not obligatory. Local subcutaneous inoculation of newborn CBA mice with crude suspensions of an A strain mammary adenocarcinoma resulted in sufficient tolerance in most of them to facilitate progressive growth of the tumor which did not metastasize (7). It is conceivable that the melanoma cells had gained lodgment and given rise to tumor deposits of appreciable size in their fetal hosts *before* the development of immunological competence.

Studies on DBA mice inoculated intravenously with suspensions of a widely metastasizing, strain-specific, malignant melanoma at various stages of pregnancy gave evidence of the presence of tumor cells in the blood stream of some of the offspring at birth. However, no tumors developed (86).

Attempts have been made to increase the permeability of the placental barrier, and so increase the exchange of cells between mother and fetus. Lengerová (58) irradiated the exteriorized gravid uterine horns of outbred rats on the 15th day of pregnancy (the rest of the mothers' bodies were shielded) and found that this conferred a high degree of tolerance of maternal skin grafts upon the offspring. In mice similar attempts to "weaken" the placental barrier with X-rays, leading to tolerance of maternal skin grafts (74), or to enhanced pas-

sage of Cr^{51} labelled red cells (34) from the maternal to the fetal circulation, have been unsuccessful.

In rabbits, administration of hyaluronidase and/or histamine in high dosages to pregnant does, from the 11th day of pregnancy onwards, partially or even completely abrogates the ability of a considerable proportion of the offspring to reject homografts of maternal skin when they are 6 weeks old (75, 76). Of particular interest from the point of view of feto-maternal passage of cells is the finding that many of the treated does proved to be partially or completely tolerant of grafts of their offsprings' skin (75). Administration of hyaluronidase has also been shown to double the number of maternal red cells that normally cross the placenta during the last 2 weeks of pregnancy.

When appreciable numbers of immunologically competent cells are included in cell suspensions inoculated into very young, immunologically immature homologous hosts a frequently fatal syndrome, known as runt disease, usually results (5, 79, 96). This impairs growth, causes an initial lymphoid tissue hyperplasia and is frequently accompanied by abnormalities in the skin. Although the pathogenesis of this disease is still not properly understood, it is known to be the outcome of an immunological reaction on the part of the inoculated immunologically competent cells against the foreign transplantation antigens of their host. With some mouse strain combinations neonatal inoculation of fewer than a million lymphoid cells can produce this disease in every host within about 2–3 weeks.

Since the small lymphocyte population of peripheral blood includes immunologically competent cells (see 13), the possibility exists that runt disease might sometimes occur naturally as a consequence of the chance passage of sufficient numbers of these cells across the placenta. In man, apart from runt disease, hemolytic disease of the newborn might also very rarely be caused by immunological attack by maternal lymphoid cells from *within* (5). This might account for the small proportion of recorded cases in which no evidence of sensitization was forthcoming from examination of the maternal blood.

Fortunately, so far as I'm aware, runt disease remains a purely theoretical hazard of pregnancy. It has not been recognized clinically nor has it been observed even in those experimental or natural situations which can reasonably be supposed to have enhanced the natural exchange of leucocytes between mother and fetus (see above). However, we must bear in mind the hypothesis advanced by Green, Inkelas and Allen (39) that Hodgkin's disease, which shares certain characteristics in common with runt and other homologous diseases, may be the outcome of maternal-fetal lymphocytic chimerism.

In considering the influence of "naturally" transmitted low dosages of maternal cells on the fetus, we must not neglect evidence indicating the acquisition of immunological competence, at least so far as transplantation antigens are concerned, long *before* birth in some species. Fetal sheep can reject with normal rapidity skin homografts transplanted to them between the 120th and 139th day of their 150 day gestation period (90, 94). Histological evidence has recently been presented that the human fetus may be capable of responding immunologically to infection with syphilis and toxoplasma during the third trimester, and possibly during part of the second (93), so that its ability to destroy homologous cells of maternal origin may also be developed at an early stage. This might help to explain the rarity of transplacental passage of malignant disease.

Until recently, it was generally believed that if inoculation of newborn mice or rats with homologous cells did anything at all, it induced tolerance. However, as Michie and Howard (72) first demonstrated, and others have confirmed (12, 18), exposure of these animals at birth to very *small* numbers of cells—too few to cause tolerance—may elicit a weak though possibly transient *sensitivity*. How soon *before* birth they acquire the ability to become sensitized as a result of exposure to small numbers of cells remains to be determined.

Perhaps in the light of these findings it is not too surprising that immunological competence on the part of some ingredient of the near-term C57BL/6 strain mouse placenta has been established, on the basis of the capacity of its dissociated cells to cause runt disease on inoculation into genetically susceptible neonatal hosts (27). Appropriate controls excluded the possibility that contaminating leucocytes of *maternal* origin were responsible for this reactivity. However, in view of suspicions that competence of mice of this strain to react against strong transplantation antigens matures very early (it is very difficult to induce tolerance by inoculation of neonatal C57 hosts with even large dosages of homologous cells) immunologically competent cells in the fetal *blood* present in the placenta may have been responsible.

IV. CONCLUSION

In a teleological sense Nature had to find an effective solution to the homograft problem as an essential pre-requisite for embarking upon the evolution of mammals. Further analysis of the tactics she has adopted will undoubtedly lead to a better understanding of some of the "hazards of being gestated" (45) and the aetiology of certain rare diseases associated with pregnancy. In addition, further enlightenment may be forthcoming concerning a possible simple means of specifically abrogating homograft reactivity in adult individuals.

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The Numerical Method in Therapeutic Medicine[1]

By MICHAEL B. SHIMKIN, M.D.[2]

MEDICINE is an important but small component of the total of human activities. For good or bad, medicine must integrate with the social and economic as well as the scientific patterns of its community and its time. When medicine appears to be out of step in its ecology, critics are fast and numerous. The ridiculous sketches of physicians in Molière's comedies, and the savage etchings of Goya, in which physicians appear with donkey heads, cannot be dismissed as mere caricature. They also portray, alas, the inadequacies and the pomposities of medicine during their time.

In our society, criticisms of certain aspects of medicine are not difficult to find. When such criticisms reach public consensus, they are voiced through hearings and legislative acts in the Congress of the United States. It is neither justified nor prudent to condemn these as uninformed politics, to be resisted at all points along the line. Rather, it is preferable to examine objectively the circumstances that lead to such manifestations, and to initiate remedial measures in which the interests of the public and of the medical profession are restored to balance.

The case in point is the Federal Food, Drug and Cosmetics Act of 1962, which attempts to correct, and perhaps to over-correct, some of the practices that stemmed from the cornucopia of chemotherapeutic agents that has deluged medicine during the past twenty-five years.

During the therapeutically doldrum period of the thirties, useful drugs could be counted on one's fingers. Then came steroid hormones, sulfonamides, antibiotics, antihistamines, tranquilizers—each with dozens of modifications, some of structure and substance, others of packaging and trivial names. Obsolescence of drugs as an economic problem approached that of obsolescence in detergents. Untoward effects required special monographs, with such revealing titles as, "Diseases of Medical Progress" (1).

It is not surprising, therefore, that regulations under the Federal Food, Drug and Cosmetics Act of 1962, require more stringent evidence of safety for new drugs. Included are tests for genetic effects over several generations of animals, in order to avoid a recurrence of the thalidomide tragedy. There are requirements of prompt reporting of side effects in patients, and prompt withdrawal of suspected drugs from the market. Usefulness as well as safety is introduced as a criterion of acceptability of new agents. There are also, unfortunately, provisions regarding labelling that are interpreted as prohibiting interstate shipment of placebos required in double-blind tests. And the whole Act has generated an increasingly undigestible bolus of reports, forms and other paper that makes life unhappy for pharmaceutical firms, investigators and government officials.

A fair estimate of the Act lies somewhere between the view that this is another horrible example of government control over free enterprise, and the view that it will solve all problems. In any case, the medical profession is square in the middle of the issues, and cannot avoid being involved. Mere opposition would represent a withdrawal syndrome that invites further restrictions. Complete acquiescence would imply a confidence in Washington approaching delusional euphoria.

It is my thesis that the Act is promising evidence that scientific research methods may be finally catching up with therapeutic clinical medicine. And it is high time, too,

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since this race has been going on for over a century, with the victories of the scientific method over tradition and the art being far from constant or sustained.

I would like to defend my thesis by historical events, which afford the clarity of retrospection.

Yesterday and Today

When the City of Philadelphia was visited by the scourge of yellow fever in 1793, Dr. Benjamin Rush was ready. His sleepless activities during the epidemic demonstrated his personal bravery, and his complete confidence in his cure of yellow fever by blood-letting and purging. He was taken to task by a layman, William Cobbett, who in a pamphlet of 1800 insisted that during the height of Dr. Rush's activities deaths from yellow fever not only did not abate but steadily rose. His conclusion was devoid of charity, estimating Dr. Rush's cure as "one of those great discoveries which have contributed to the depopulation of the earth." Cobbett was convicted of slander and fined for his intemperance of pen (2). Benjamin Rush continued as the outstanding medical figure of his day, and modestly admitted that "Medicine is my wife and science my mistress." Years later this afforded Oliver Wendell Holmes a seldom-neglected opportunity to turn a phrase. Said Holmes, "I do not think that the breach of the seventh commandment can be shown to have been of advantage to the legitimate owner of (Rush's) affections" (3).

In 1835, Pierre Charles Alexandre Louis of Paris (Fig. 1) published his studies (4) on the effect of blood-letting in pneumonia, erysipelas and other inflammations, and showed convincingly that no benefit was attributable to bleeding. Louis combined careful observations in the clinic and the pathology laboratory with analysis of the course in patients treated by bleeding and in other patients not so treated. He wrote (5), "To assure ourselves of the superiority of one or other (treatment). . . . in any disease whatever . . . is doubtless to be done by enquiring if under these circumstances

FIG. 1. Pierre Charles Alexandre Louis (1787–1872).

a greater number of individuals have been cured by one means than another."

Louis named his approach the Numerical Method, and opened the first chapter of clinical biometry, the application of statistics and other mathematical techniques to clinical problems. It has been a vigorous field, expanding the primitive method of Louis by the use of the calculus of probability, tests for significance, correlation coefficients, and the formal design of investigations with randomized assignments, double-blind precautions, and sequential analysis. Table 1 indicates some of these historical landmarks, as recorded by Singer and Underwood (6). It is noteworthy, and not attributable to the fact that the compilers are British, that all the persons of this list are French or English and that no Americans are included. The introduction of mechanical and electronic computers, however, is a legitimate recent addition to the list.

These advances lay lightly on clinical medicine. During our Civil War, blood-letting and purging were still popular. The Surgeon General for the Union, Dr. William A.

TABLE I

Historical Landmarks in Clinical Biometry

Pierre Charles Alexandre Louis (1787–1872)
"The Numerical Method", *1835*
Adolphe Quetelet (1796–1874)
Probability and normal curve, *1846*
Francis Galton (1822–1911)
Correlation coefficient, *1869*
Karl Pearson (1857–1936)
Chi square test for significance, *1900*
William Gosset ("Student") (1876–1937)
Technique of small samples, *1908*
Ronald Fisher (1890–1962)
Design of experiments, *1935*
Bradford Hill (1897–)
Clinical trials, *1945*.

Hammond, was dismissed partly because he removed calomel and tartar emetic from the approved list of medical supplies (7). It would be interesting to compare the volume of blood spilled on the battlefields with the volume removed for assumed therapeutic intent by physicians.

But let us progress to today. In important medical journals, there appears a full-page advertisement of a respected pharmaceutical company, of a progestational compound for the treatment of threatened abortion. A lovely girl, heavy with child, looks mistily into a blossoming tree. The trade name of the compound, in large red letters, is followed by the claim that 80 per cent of threatened abortions are salvageable. There is a reference to an article documenting the claim. But there are two studies, one in Australia (8) and one in Texas (9), in which the progestational agent was used along with a parallel group of controls that received a placebo. In both investigations, 80 per cent of the threatened pregnancies were saved. This was also exactly the result in both placebo-treated groups.

And here is what Weatherall (10) concludes in his coldly objective review of tranquilizers, published in 1962. First, he finds that no more than one-third of clinical reports on tranquilizers are scientifically acceptable in that they contain some semblance of comparative controls. On the basis of designed clinical trials, he states, "In anxious patients the most successful if not the only successful drugs are barbiturates. They are clearly effective and, unlike all the newer drugs, their toxicity is not gross and is well known."

Therapeutic Response

The utility of biometry in medicine is well illustrated in the consideration and evaluation of treatment in carcinoma and other neoplastic diseases. One of the virtues of using cancer as an example is that it has a clear, all-or-none end point of survival or non-survival. However, the principles are applicable over a wide range of situations in therapeutic medicine.

What is meant by therapeutic response with survival as the end-point is portrayed in Figure 2. Curve A represents the mortality of a "normal" population of a certain age, sex, region and chronologic period comparable with the population represented in Curve B, of untreated patients with a disease that accelerates the mortality rate. The difference between Curve A and Curve B is a measure of the additional risk of mortality incurred by the presence of the disease. Note that even during the time interval between 8 and 10, the slope of Curve B is steeper than the slope of Curve A, indicating that this increased risk is maintained throughout the total period that is represented.

If a procedure that is curative in almost all

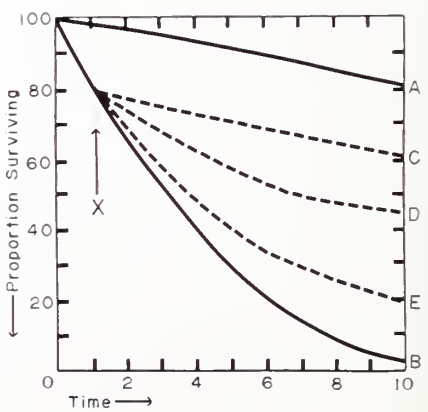


Fig. 2. Effects of treatment on survival in a disease.

patients is carried out on the diseased population at point X, the slope of Curve B would change promptly to the slope of Curve C, which is parallel to Curve A. This means that the additional risk incurred by the disease has been removed. Such a result might be anticipated in the treatment of *in situ* carcinoma of the uterine cervix. If the procedure cures an intermediate proportion of patients, there will be a more gradual deceleration of the slope, as in Curve D, which remains steeper than Curve A until time 6, but then becomes parallel to Curve A. A therapeutic effect short of curative but yielding an objective decrease in mortality is shown by Curve E, which fails to become parallel to Curve A but assumes a rate significantly slower than that of Curve B.

All such comparisons are valid, however, only to the extent that the groups represented by the curves to be compared are indeed *comparable*. Consider for example, the effects of selection upon Curve B. If treatment were instituted an interval before the point indicated by X, an apparent improvement in survival would be obtained five intervals later, despite the fact that the mortality curve is unaltered. This effect can be achieved by operating on metastatic but asymptomatic lung cancer, picked up by x-ray surveys. Without actual improvement in survival, a longer treatment-to-death period would be recorded. Or, conversely, if treatment is delayed to the fourth interval, a better proportional survival would result five intervals later, simply because the mortality rate is steeper during the earlier periods. This phenomenon is involved in the paradox that in patients with cancer of the stomach or of the breast survival appears to be inversely related to the length of time between the onset of symptoms and treatment. It may also be a factor in considering patients who receive preoperative radiation if no adjustment is made for the fact that in these the operation is delayed. This delay would select out patients with the more rapidly evolving disease, with the result that a spuriously better result would be recorded among those who are operated following radiation than among those who undergo immediate surgery.

An unequal distribution of patients between the groups represented by E and B, by stage of disease, by the presence of other diseases or complications, by other therapeutic measures, and by a myriad of additional identifiable or unknown factors, may alter entirely the conclusions that would be drawn. Comparisons may be invalid because the groups are simply non-comparable.

Retrospective Analysis

The state-wide cancer registry of Connecticut, which has been in operation since 1935, has yielded data that bears on some of these points, and also reveals the limitations of retrospective analysis.

Figure 3 shows the long-term end results in the treatment of clinically localized cancer of the breast and of the large intestine. In this graph, the anticipated mortality of the population represented by Curve A of Figure 2 is indicated by the upper 100 per cent line. The annual mortality of patients with cancer is expressed as a percentile of the anticipated mortality. When this percentile is under 100, an increased mortality risk exists; when it reaches and is maintained at 100, the increased mortality risk has been removed. This is

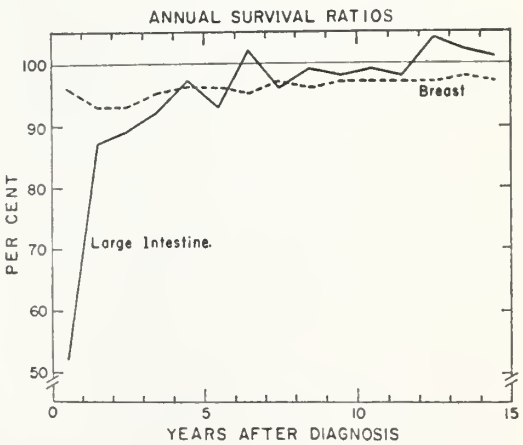


FIG. 3. Relative survival of patients with localized cancer of the breast and of the large intestine, in Connecticut. From Cutler, S. J. (11)

designated as the *relative* mortality rate, and it is of course derived after appropriate adjustment for age, sex, and chronological period (11).

Note that in the case of cancer of the large intestine, the risk is sharply increased during the first few years, but between 6 and 7 years it reaches and remains at the level of the anticipated general mortality. This is an example of Curve D of Figure 2. In contrast, for breast cancer, the increased risk is lower but does not reach the general mortality level during the whole observation period of 14 years. This is an example of Curve E of Figure 2.

The conclusions to be derived are that a proportion of patients with cancer of the large intestine treated by surgery are cured, but that this effect is not demonstrable for cancer of the breast.

A recent contribution to the use of this method of analyzing survival data is the report on Hodgkin's disease and lymphosarcoma from Manchester, England (12), which comes to the conclusion that a proportion of these patients is cured by intensive radiation therapy. It is important additional evidence of the view that the completely pessimistic outlook that has prevailed in these diseases requires revision.

The examples given so far represent one type of retrospective analysis of data. Such analyses have a number of inherent errors, the most serious one being that the extent and nature of selection of patients for any group cannot be exactly known, so that comparisons at best must be tentatively drawn. There are techniques for retrospective "pairing" of patients treated by a particular method with presumably similar patients treated by other methods, and of "stratifying" series so that at least the obvious sources of bias are adjusted. This approach needs further exploration and has the undoubted attraction of using to full advantage experiences that are already accumulated.

Problem of Untreated Controls

It would be useful if we had reliable data on the natural survival and other features in patients with untreated disease. This is neither possible nor ethical in cancer and other serious diseases for which effective or accepted treatment is available. The "untreated" cases of cancer that are recorded in the older literature, such as Major Greenwood's classic report of 1926 (13), are instructive but limited as tentative baselines.

Every large group of patients with cancer today will contain a proportion that receives at least no definitive treatment. Such patients obviously are not representative of all patients with the disease, but should not be ignored because they do provide some information (14).

In many clinical problems, however, it is not strictly necessary to demand an untreated control group. After all, the desired end-point is an improvement in results, so that newer procedures should be tested against the "best available" management. When there is no agreement as to what procedure is preferable, a comparison of two or more treatments is indicated. Of course, when many forms of treatment appear to yield the same results or lack thereof, suspicion should arise that none is really effective and a no-treatment group in subsequent comparisons may be acceptable. Even in such instances, palliative or symptomatic relief would be afforded to patients whenever possible, so that they would not be "untreated controls" in a laboratory animal sense. I have suggested (15) sometime ago that the emotion-charged word, "control," be discarded in clinical investigations, and the more descriptive term, "contratest," be adopted in its stead.

Recourse is sometimes made to comparison of effects in patients who respond and others from the same series who do not respond to treatment. Almost by definition, survival, or other end-point, would be superior among the responders than among the non-responders. It may be then implied that the non-responders

represent the baseline, somewhat like an untreated group, and that the superiority of the responders is attributable to the treatment.

This situation is analogous to dividing a crate of apples into two boxes, one for large apples and the other for small apples. If the apples were of different sizes, a statistically significant difference between the two boxes would be achieved, but the implication that this sorting increases the size of the larger apples would be hardly justified. The differential between treatment responders and nonresponders likewise may be due to a separation of favorable and unfavorable patients, without effect of treatment except as a separating device. Indeed, this may indicate that untoward effect occurred among the nonresponders, so that the difference is due to increased mortality among them rather than a decreased mortality among the responders.

This problem is not obviated by comparisons of groups, both of which receive some form of treatment. An example of this occurred in an analysis of patients with lung cancer treated by pneumonectomy and by lobectomy (16). Among patients with more extensive but technically operable disease, survival was better following lobectomy, as indicated in Figure 4. Obviously this was not because better results were achieved by the more limited operation, but because the more extensive resection increased mortality.

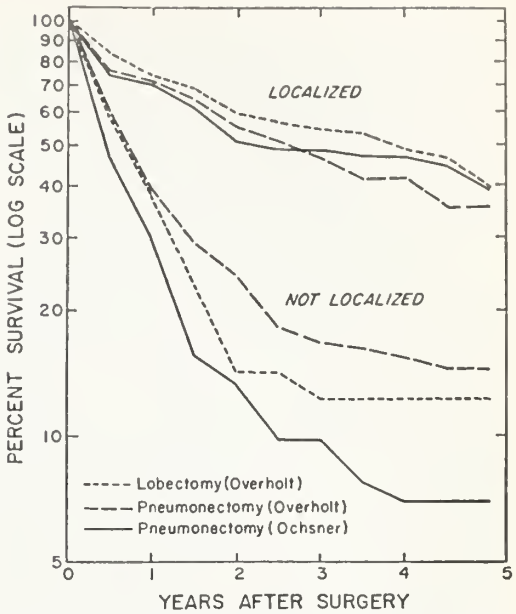


FIG. 4. Survival of patients with lung cancer following pneumonectomy and lobectomy. From Shimkin, M. B., *et al.* (16)

Designed Clinical Trials

Accepting that science is measurement, and that most measurements are comparative, we come to the key question in the evaluation of clinical therapeutics. This question is: with what patients should the treated patients be compared?

Most patients are selected for treatment. Criteria for such selection differ between institutions and between physicians. Moreover, there is known or unknown selection resulting from the type of population an institution or a physician serves. Consecutive series, historical controls and even alternate cases have been shown not to meet the requirements of strict comparability, and such comparisons usually lead to more disputations rather than to clarifications.

The techniques of the modern designed clinical trial are applicable to these problems. One of the developers and an outstanding proponent of designed clinical trials has been Sir A. Bradford Hill of London. I recommend for literary pleasure as well as for instruction his addresses (17) on this subject, and his textbook on medical statistics (18), now in the seventh edition.

The first requirement for a designed clinical trial is the precise statement of the problem it plans to answer, the exact, specific details of the procedures it will follow, and the definitions regarding patients it will include in the study. The second requirement is that two or more *groups* of closely similar patients must be observed at the same time, under the same circumstances, but differing in the treatment to be compared. The third requirement is that

the assignment of patients to these groups must be by some process of *random* allocation. And, finally, it is desirable, whenever possible, to minimize the inevitable biases of the patient and of the physician by disguising the difference in the treatments to be compared by blinding or double-blinding procedures.

The principle of randomization, and the feature of blinding have been responsible for much of the resistance to, and misunderstanding about designed clinical trials. The word "random" has been confused with "haphazard," whereas actually this is a carefully planned scheme that invokes the laws of chance in order to overcome known and unknown sources of selection and bias. The term "double-blind" has become a fertile topic of medical humor, and a staid synonym would at least reduce the mirth index.

Of course, designed clinical trials are not completed until they are analyzed, written up, and reported. In this time-consuming process, the adequacy of the randomization and all technical factors is again surveyed and may be redetermined by further "blind" interpretation of data. Statistical tests for significance, and the correlation of various features of the patients to response may lead to additional dividends and the design of further investigations.

Adjuvant Cancer Chemotherapy

In 1955 the National Cancer Institute embarked upon an ambitious program toward the development of chemotherapeutic agents in cancer. Under the leadership of its Clinical Panel, chaired by I. S. Ravdin, a series of designed clinical trials in cancer were initiated (19). In addition to these drug development studies, interest was aroused in the question of whether chemicals such as nitrogen mustard, that have partial effects on some forms of advanced cancer, may have more definite effects if used at earlier stages of disease. It was accepted that such investigations were possible only if the chemicals were used as adjuvants to standard resective surgery. One of the many factors that led to the initiation of the adjuvant chemotherapy trials was that surgeons here and there were already using toxic alkylating chemicals with this idea in mind but without proof of efficacy.

Protocols were prepared for the trial of nitrogen mustard (HN_2) or triethylenethiophosphoramide (TSPA) as adjuvants for surgical resection of cancer of the lung, stomach, colo-rectum and breast (20). At the completion of the operation, a sealed envelope from a prepared randomized set was opened, containing instructions as to whether the particular patient was to receive the drug or was to be included in the control group. Copies of reports were sent to a central biometric office.

Two groups of investigators, one comprising hospitals of the Veterans Administration, and the other from University departments of surgery, accepted participation in the studies.

Within a few months, the Veterans Administration group reported that post-operative morbidity and mortality were increased by the use of the alkylating agents at the doses selected (21). In pulmonary resection, the 30-day mortality increased from 12 per cent without HN_2 to 22 per cent with HN_2, and in gastric resection, from 11 per cent to 23 per cent with TSPA. A wide variety of complications and untoward happenings were reported with greater frequency in patients receiving the alkylating agents.

The program was continued with the substitution of two coded types of ampouled material, given post-operatively on a randomized basis and double-blinded. Both of these materials were sodium chloride. Post-operative complications promptly equilibrated between the two groups of patients, and the post-operative mortality dropped to that previously observed among the control groups.

Although the University experience failed to indicate an increased mortality with the addition of HN_2 or TSPA to surgery, the investigators decided to reduce the course of HN_2 from 0.4 to 0.3 mg. per kilogram, and TSPA from 0.8 to 0.6 mg. per kilogram, and to double-blind the study (22). All patients

now received the contents of similar ampoules, some of which had the drug and others contained a placebo, sodium chloride. With these elaborations, no increase in post-operative mortality or complications was experienced.

The results of the Veterans Administration investigation (23) in cancer of the lung are summarized in Figure 5. It is abundantly clear that survival was not improved by the addition of nitrogen mustard. Analysis of various subgroups failed to reveal more subtle differences, and the results of the University investigators were superimposably the same. The answer is clear: there is no indication for using HN_2 at tolerated doses following resection for lung cancer. At higher doses there is a possibility of increasing mortality. Parenthetically, the results in the adjuvant use of TSPA in cancer of the stomach and of the colo-rectum were as negative as in the lung cancer study.

A similar study of the use of TSPA in radical mastectomy by University investigators (24) is summarized in Figure 6. Here the result is interestingly positive, and shows that this adjuvant procedure does yield a demonstrable decrease in recurrences. The first phase of the investigation has been criticized because of the unusually high rate of recurrence in the control group. It is probable that during this phase many participants did not include in the study patients with smaller, localized breast cancers, so that they entered neither the treated nor the control groups. With further experience, and suggestion that an effect was being observed, the second phase of the study probably contains a more representative sample of operable mammary cancer.

Analysis of the subgroups in this investigation showed that the major effect was evident in younger, pre-menopausal women with metastases to the axillary lymph nodes. Their over-representation in the first phase of the study probably contributed to the greater differentiation between the treated and the control groups. Here again we have some definite answers, indicating that TSPA is a useful adjunct to surgery for breast cancer with regional metastases in premenopausal women.

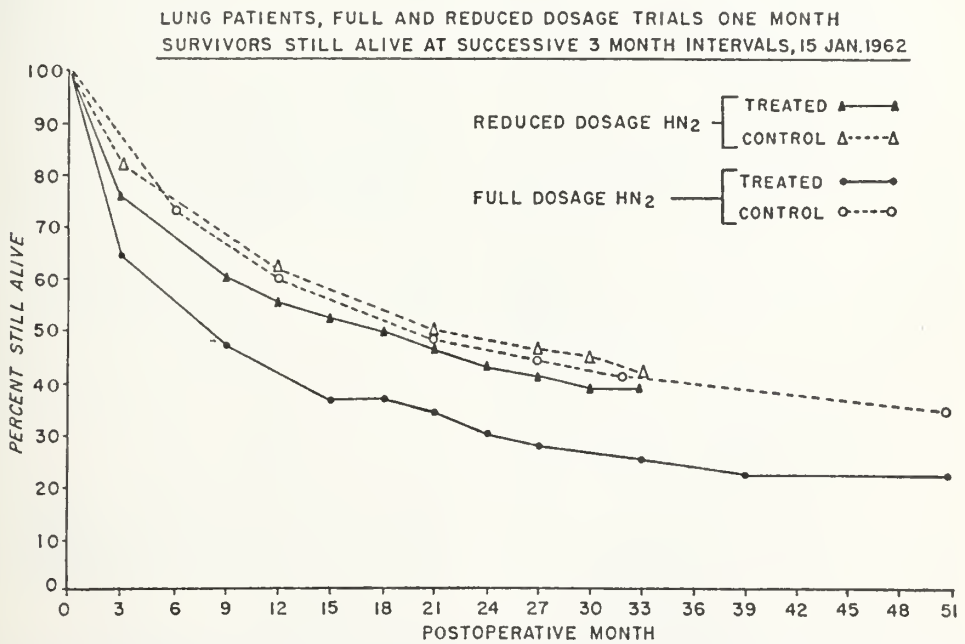


FIG. 5. Survival of patients with lung cancer with and without postoperative nitrogen mustard as a adjuvant therapy. Studies of Veterans Administration adjuvant cancer chemotherapy group. From Hughes, F. A. and Higgins, G. (23)

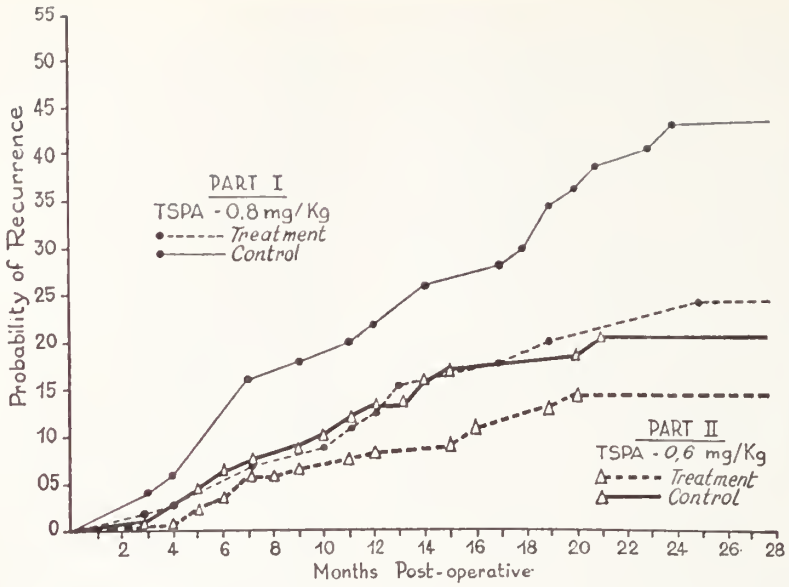


FIG. 6. Recurrence of cancer in patients with breast cancer with and without postoperative triethylene thiophosphoramide. Studies of University adjuvant cancer chemotherapy group. From Noer, R. J., et al. (24)

The investigations are now continuing with other experimental drugs and procedures.

The conduct of a designed clinical trial, like all complex investigations, is difficult and full of pitfalls. This is especially true when the condition that is studied has important psychological components, and when the responses involve subjective reactions of patients or subjective interpretations by investigators. Walter Modell (25) has written informatively and wittily about some of these problems.

Designed clinical trials also have ethical considerations that require understanding. For example, is it ethical to withhold treatment from patients, or not to know whether a patient is receiving a possibly active drug or an inert placebo? Bradford Hill (26) has contributed a thoughtful discussion of these and related questions, and his conclusion, in effect, is that the answers depend upon the specifics of the specific situation. I, too, have been involved in many discussions of the knotty subject of experimentation on human beings (27) and have come to the conclusion that in most situations there are no irreconcilable differences between sound science and the ethical practices of medicine. This does not mean that there are no problems, for these will continue to exist in all considerations involving the frailties of human judgment. Particularly vexing are studies on children and other people who are legally incapable of giving their consent to participating in such investigations. The tentative answer here is that human judgment, carefully reviewed by technically qualified groups of experts, must be invoked. It should be fully realized that errors and criticisms cannot be entirely avoided, but that the price of inaction is greater than the risk that may be incurred.

Therapeutic Medicine and Public Health

The primary concern of clinical medicine is with the individual patient; the primary concern of public health is with the community of people. The goals are identical, for individuals are but units of a community, and a community is but a group of individuals.

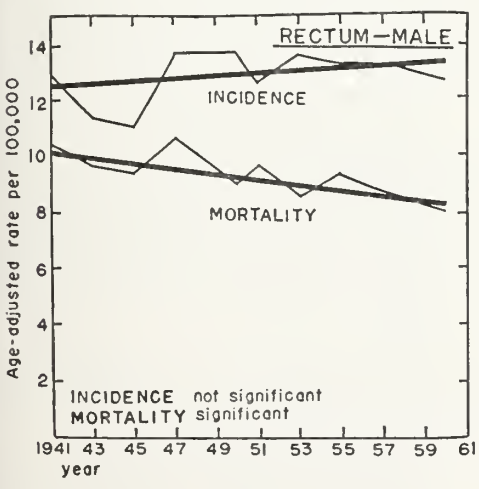
The end point of therapeutic medicine is also the effect its contribution has on all patients. A useful therapeutic modality should reflect itself in the reduction of the mortality or morbidity from the disease in the total

population. Conversely, when these effects are not demonstrable, further examination of the therapeutic approach certainly seems indicated. Examples of this are afforded by the analysis of data on cancer recently published by the New York Department of Health (28).

Figure 7 shows the trends in cancer of the rectum in males. During the 20-year period 1941–1960, there has been no significant change in the incidence of the disease; that is, the annual occurrence of rectal cancer, per 100,000 age-adjusted males, has remained the same. During this period, the annual mortality from the disease has shown a modest but significant decline, of about 15 per cent. We cannot distinguish, from these figures alone, the effect of possibly better treatment from the influence of earlier recognition. Other studies suggest that it is attributable primarily to an increasingly greater proportion of patients that are surgically resected and thus, presumably, resectable. This analysis indicates that a partially effective form of therapy is having a demonstrable effect upon a defined population. Further emphasis on earlier detection and treatment is supportable by these data.

Figure 8 summarizes the trends in cancer of the breast in females. In contrast with the findings in rectal cancer, here both the incidence and the mortality have remained entirely stable over the last 20 years. The difference between incidence and mortality is an index of survival, either natural or therapeutically induced. These data show that neither earlier detection, such as was hoped from self-examination of the breast, nor changes in the treatment of breast cancer during the past 20 years, have been reflected in any demonstrable effect in the population. The results would suggest a careful reappraisal of our concepts regarding breast cancer and of the extent to which these concepts are being realized (29).

We have now taken the full tour, from Louis in 1835 enunciating his Numerical Method, to the elaborations and developments that have occurred in clinical biometry during the subsequent century. It is a difficult, time-consuming process to establish the efficacy and the indications of any form of treatment, calling for careful planning, meticulous detail, group participation, and conservative interpretation. And more work, because the completion of any study is but another step in a never-ending continuum.



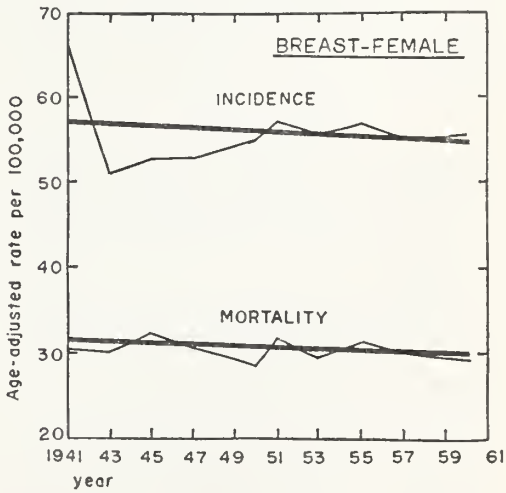


FIG. 7. Incidence and mortality of males with cancer of the rectum, New York State exclusive of New York City, 1941–1960, in age-adjusted rates per 100,000 males. From Ferber, B., et al. (28)

FIG. 8. Incidence and mortality of females with cancer of the breast, New York State, exclusive of New York City, 1941–1960, in age-adjusted rates per 100,000. From Ferber, B., et al. (28)

In this continuum, retrospective analyses and population comparisons also continue to be valuable sources of information.

It is evident that in order to achieve the full development and utility of these sources of knowledge, there must be cooperation and collaboration between physicians and their institutions, with central biometric staffs to assist in planning, execution and analysis of clinical investigations. Despite the complexities and the short-comings, these methods are the most economical and the most reliable ones at our disposal, through which we can derive answers to many problems of therapeutic and preventive medicine. And these answers may treat roughly some cherished traditions and preconceived notions which we have long held so dear.

The words of Louis (5) are as relevant today as in 1835: "The only reproach which can be made to the Numerical Method . . . is that it offers real difficulties in its execution . . . But . . . research of truth requires much labour, and is beset with difficulty." As physicians, we can fulfill our role by contributing to and accepting scientific quantitation rather than hallowed tradition. It is the only way we can also fulfill the valued admonition of Hippocrates, "Primum non nocere." Freely translated into the English language of today, this is, "Before you are useful, be sure you are harmless."

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Albert Schweitzer: Some Bibliographical Digressions[1]

By HOWARD C. RICE, JR.,[2]

LEST I appear under false pretenses, let me say at once that, in agreement with those who have invited me to speak, this will not be a lecture on the history of medicine. Although a doctor is the ostensible subject, this will not be a discussion of his medical activities, nor even a description of his famous hospital at Lambaréné. I call this talk about Albert Schweitzer "some bibliographical digressions," because I happen to be a librarian and an historian, and because during the past few years I have been engaged in the task of gathering—"collecting," if you will—writings by and about Dr. Schweitzer.

It began several years ago when I had the good fortune to spend a year in Strasbourg, the chief city of Schweitzer's Alsatian homeland. Although the Doctor's reputation and influence have long since transcended this particular corner of France, his name is held in high esteem there and he really belongs to this province in a very special way. Indeed, when re-reading there his well-known autobiography, *Out of My Life and Thought*, I found that it provided, among other things, an admirable key to the region where I was sojourning and that it enhanced the significance of places and people surrounding me. It also suggested to me that it would be worth while to assemble, for the Princeton Library, as many as possible of the writings by and about Schweitzer. Taking the "leads" found in *Out of My Life and Thought*, and with the further help of a bibliography compiled by Robert Amadou,* I started in, not at first realizing the magnitude of the task, or how far it would lead me.

Few men of our times have so consistently and tirelessly recorded their lives and thoughts on the printed page as has Dr. Schweitzer. His first publication is dated 1898; the most recent, 1962. His major works, originally written in German or in French, have frequently been reprinted (often with important revisions), and have been translated into many languages (with additional notes or prefaces); his contributions to periodicals and composite works have been numerous, while the world-wide literature of commentary or interpretation written by others about him is still more extensive. Few men, furthermore, have achieved eminence in so many fields. For the sake of convenience it is possible to group his writings under such headings as: autobiography, New Testament scholarship, music, medicine and practical philanthropy as exemplified in the Lambaréné hospital, Africa, and the philosophy of civilization. Nevertheless, such classifications serve only as a temporary scaffolding, and it soon becomes apparent that all the writings are interrelated and form part of the grand design of his life as a whole.

It is comparatively easy for a collector to acquire Schweitzer's major works—most of them now available in paperbacks—but not always so easy to find them in their original editions. There remain, however, many "fugi-

[1] Victor Robinson Lecture IV, Temple University School of Medicine, 31 October 1962. This lecture is published to salute Dr. Schweitzer, Honorary Fellow of The College of Physicians of Philadelphia.

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* Robert Amadou, *Albert Schweitzer, Eléments de Biographie et de Bibliographie*, Paris, L'Arche, 1952. A still more extensive bibliography, and covering publications of the last decade, is in preparation by Mrs. Laura Person of New York City.

tives" which have not appeared in ordinary "trade books," but in such relatively obscure places as parish bulletins, defunct local periodicals, missionary leaflets, and doctoral dissertations. There are, for example, many concert programs with notes by Schweitzer; reports on the Lambaréné Hospital published in several countries and languages; the *Festschriften* compiled in Schweitzer's honor, or those in honor of others to which he has contributed. If one turns to the extensive writings about Schweitzer, the field begins to appear limitless. Many of these books, pamphlets and articles, especially those which have appeared at an accelerated pace in recent years, are repetitious and—to put them in the most charitable light—trivial. They often betray a disconcerting lack of familiarity with Schweitzer's own writings, but nevertheless form part of the historical record of the impact of the Doctor's life and thought on his contemporaries.

From this rich accumulation of Schweitzer's writings I have selected as a pretext for my digressions a few items relating chiefly to his early life—what we might call, in book-collector's language, the Schweitzer *Wiegendrucke* or *incubula*, that is, as the words indicate, publications from his "cradle days." These may, I hope, help you to appreciate and understand some of the formative influences in Dr. Schweitzer's life—the fruits of which are apparent today.

As a general commentary, bear in mind that Albert Schweitzer was born on January 14, 1875, in the Alsatian town of Kayserberg, where his father was the Protestant minister; shortly after his birth the family moved to nearby Gunsbach, where his childhood was spent. These villages are in the vine-covered eastern foothills of the Vosges Mountains not far from the city of Colmar, which is in the Rhine plain. Across the river, like the opposite page of an open book, are the mountains of the Black Forest. On the horizon, to the north, appears the spire of the Strasbourg Cathedral. Schweitzer went to secondary school in Mulhouse (or Mülhausen, as it was then called) and thence to the University of Strasbourg, where he obtained degrees in philosophy, in theology, and in medicine. There were also periods of study in Paris and in Berlin. Strasbourg was his residence until his departure for Africa in 1913, and has remained, with Colmar and with Gunsbach, where he later built a house near his childhood home, the European base for his activities. Four years before Schweitzer's birth the province of Alsace, which had been part of France since the 17th century, was annexed to the German Empire and remained under German rule until 1918 when it again became part of France—and has so remained, except for the temporary German Occupation of 1940–1944.

This Alsatian background explains Schweitzer's double cultural and linguistic heritage. Like other children of his time and place — and as is still the case, at least in the smaller villages of Alsace—he spoke the Alsatian dialect, a Germanic dialect, which is not however a written language, except when a few "folklorists" or "dialect poets" attempt to transcribe it. Standard German and French were also familiar to him from his childhood. Although his father preached most of his sermons in German and wrote village tales in the manner of Jeremias Gotthelf (the Swiss storyteller), it was nevertheless the custom in the family to write all their letters to each other in French. The children were familiar with the *Schwarzwälder Dorfgeschichten*, the tales of the Black Forest by the German writer, Berthold Auerbach, as well as with the stories of such French writers as Erckmann-Chatrian or Alphonse Daudet. In his Uncle's library at Mulhouse—as one perceptive commentator has pointed out*—young

* Robert Minder, "Albert Schweitzer, l'Alsacien," in *Albert Schweitzer, Etudes et Témoignages*, edited by Robert Amadou, Paris, 1952. Another good comment on the Alsatian heritage will be found in an essay by Suzanne Oswald, one of Schweitzer's nieces: *Geist der Humanität, Beitrag zu einem Lebensbild Albert Schweitzers*, St. Gallen, Switzerland, 1954.

Albert could find, not only Lessing and Goethe and Schiller, but also Rousseau and Voltaire, Victor Hugo and Lamartine, whose generous humanitarianism was not merely dismissed as Jacobin nonsense, as it might have been, across the Rhine, in a purely German and Prussianized milieu. Uncle Louis, as a condition to allowing his nephew to take time from homework to read the newspapers, used to crossexamine the boy on the composition of the "three most recent French cabinets" and on the latest speeches in the German Reichstag. In short, as he himself once wrote, Schweitzer represents one of those "minds that belongs to two cultures — so necessary to both scholarship and art." Although the externals of his life have been intimately involved in the political changes affecting Alsace, he has in a deeper sense transcended them, and combines a strong devotion to his native land with a sense of the unity of European culture.

In his *Out of My Life and Thought* Schweitzer mentions that his first publication was a memorial tribute to Eugène Munch of Mülhausen, organist of the church there, who died in 1898. So, for a collector of Schweitzer's writings, this was obviously number one on the list. I looked up a copy in the Strasbourg library and found that it was a small collection of tributes printed for distribution among friends, and not a commercial publication that one could expect to find through the usual trade channels. But I knew what it looked like —a characteristic black-bordered pamphlet, somewhat like those funeral orations that were common even here in America in the 18th and 19th centuries—and could keep my eyes peeled.

One day, in the dusty back-shop of a Strasbourg bookstore, I found a pile of miscellaneous pamphlets, which might very well have been the left-over sweepings from some local minister's study, and which seemed to be a likely heap in which to search. Turning up a black-bordered pamphlet, after some rummaging, I thought for a moment that I had it. However, the date was too early,—1872, and the memorial tributes were to one Charles-Albert Schillinger, pastor of the Church of St. Nicholas in Strasbourg.* Since it was marked for a few pennies, I took it anyway, just out of curiosity and because I thought I had seen the name somewhere in Schweitzer's writings. When I consulted his *Memoirs of Childhood and Youth*, I read the following:

"When I was still so young that I hardly understood what was said to me, my mother explained to me that I had been given the name of Albert in memory of her dead brother [Albert Schillinger]. . . . This brother had been pastor of the Church of Saint Nicholas in Strasbourg. In 1870, after the Battle of Wissembourg, he had been sent to Paris to obtain medical supplies in view of the expected Siege of Strasbourg. Instead of getting the supplies so urgently requested by the doctors of the Strasbourg garrison, he found himself sent from one office in Paris to another, and when at last he was able to set out for home with a mere fraction of what had been asked for, the city was completely invested. General von Werder, who commanded the besieging [German] army, allowed these medical supplies to be taken into the city, but kept my uncle as a prisoner [at Mundolsheim]. He thus had to live through the siege among the besiegers, tormented by the thought that his flock might think that he had willingly abandoned them in this extremity. He had a weak heart, and the excitement of these months was too much for him. In the summer of 1872, he suddenly collapsed and dropped dead, amidst his Strasbourg friends.

"I was greatly concerned with the thought that I was continuing the existence of a man whom my mother loved so much, especially as I had heard so many stories of his kindness. When, after the Siege of Strasbourg, there was for a time a shortage of milk, he used to bring his allowance to a poor old woman, who after

* *Discours prononcés aux obsèques de Charles-Albert Schillinger, Pasteur à l'Eglise Française de Saint-Nicolas, le 21 Juin 1872.* Strasbourg, Treuttel et Wurtz, Editeurs, 1872. 28 pp. The tributes are by Eschenauer, Gerold, Reuss, and Leblois.

his death told my mother how, during that period, she had got her daily milk."

This little pamphlet, therefore, recalls, through the words of friends and colleagues, the career of Albert Schweitzer's Uncle Albert Schillinger, who died some three years before his namesake's birth. It can remind us, among other things, that Schweitzer descends from a long line of Alsatian Protestant ministers, who were familiar with the miseries of war and the sufferings of civilian populations. It can also remind us that Schweitzer himself, in the early 1900's, while he was teaching theology at the University and pursuing his medical studies there, in turn served as vicar and curate in this same church of Saint Nicholas, where his Uncle had served before him. Through circumstances arising out of World War I, Schweitzer again found himself ministering to the flock of Saint Nicholas, while working as a doctor in the adjacent hospital. This was in 1918 and 1919, both before and after the Armistice, when Strasbourg was again experiencing the rigors of war, and when food shortages and displaced persons were matters of pressing concern.

To return to Schweitzer's own first publication: I have recently acquired it, not from the dusty depths of a second-hand bookshop, but as the gift of one of Schweitzer's close associates. The pamphlet, following closely the pattern of the one just mentioned, contains three funeral tributes—one in German and two in French. The first and longest of them, in French, is signed only with the initials "A. S." In it Schweitzer outlines Munch's career as an organist at Mulhouse, where he himself had been Munch's pupil while he was a student in the secondary school there. Thus, in this little essay, Schweitzer has incidentally recorded the first chapter in his own musical education, for it was Munch who initiated him into the world of Johann Sebastian Bach and the other great composers. An English translation of Schweitzer's tribute to Eugène Munch (an uncle of Charles Munch, until recently director of the Boston Symphony Orchestra), published by Charles R. Joy in his anthology, *Music in the Life of Albert Schweitzer* [Beacon Paperback No. 87], is appropriately entitled "My First Organ Teacher." It may be added that when a brief acknowledgement of the gift of this pamphlet appeared in the *Princeton University Library Chronicle*, (Vol. XIX, Nos. 3/4, Spring/Summer 1958) Dr. Schweitzer in turn wrote from his Hospital at Lambaréné, in December 1958 (sixty years later): "How wonderful that you possess my Opus No. 1, the farewell tribute to Eugène Munch. I still remember how deeply moved I was when I wrote it. To him I give thanks, to this outstanding musician, that I received a deep understanding of music so early in my youth, and especially that I acquired from him the technique of organ playing. . . I am writing you these lines in the big consultation room, where three doctors are busy with the patients. I am constantly being interrupted by the questions that people bring to me. I am also called away to consult upon this case and that . . . Now I must go back to my work. . ."

Schweitzer's "Opus No. 1" inaugurates a long series of his writings on music and musicians, on organs and organ-building — a bibliographical path into which I shall not digress at length here. His books on Bach are well-known: a French *Bach* and a German *Bach*, which are really two different works, as he has explained. Both of them, I might add, carry prefaces by Charles-Marie Widor, but the two prefaces are different. Some of Schweitzer's writings on music, however, are scattered here and there, in such form, for example, as program notes. A sample, which we owe to the courtesy of Schweitzer's old friend and exact contemporary, Gustave Bret, who founded in 1905 the Société J. -S. Bach in Paris, is a program for one of the Society's early concerts, December 19, 1906, in which appear "*Notices*," or program notes, the first of many written by Schweitzer for the Bach Society's concerts. Schweitzer also participated in many of the concerts as organ accompanist, as evidenced by a poster for the concert of November 27, 1907 — which was, incidentally, the first of the Bach Society's concerts to be

given in the newly-built Salle Gaveau. A program of special interest is one for an organ recital by Schweitzer, April 25, 1912, organized by Gustave Bret and other friends. The proceeds were for the benefit of *"l'Oeuvre médicale de l'Ogooué"*, the Ogowe medical mission, where Schweitzer was to begin his work the following year. The name "Lambaréné" — which was later to acquire universal renown—does not yet appear, as Monsieur Bret pointed out when sending this program. Another pattern is here set, for, as is well-known, in subsequent years, proceeds from Schweitzer's organ recitals, given in many parts of Europe, were used by him for the benefit of the hospital on the banks of the Ogowe.

When did Schweitzer first become interested in Africa? He has given us some hints in his published reminiscences of his childhood in Alsace. These reminiscences—related with an engaging touch of humor—are to be found in the little book known in English as *Memoirs of Childhood and Youth*, more succinctly in *Out of My Life and Thought*, and in occasional scattered articles, the most interesting of which is a talk given in 1949 under the title of "Mes Souvenirs du Vieux Colmar." *Memoirs of Childhood and Youth*, written at the instigation of Schweitzer's friend, Dr. Oskar Pfister, a Zurich psycho-analyst, was first published in 1924 by the Librairie Evangélique of Strasbourg under its German title, *Aus Meiner Kindheit und Jugendzeit*; an edition in French, *Souvenirs de Mon Enfance*, was issued that same year in Lausanne, Switzerland. On the cover of the first edition is a picture of the church at Gunsbach, that church which still serves—as do several other Alsatian village churches—as a common edifice for both Protestant and Roman Catholic services.

"It is to the afternoon services at Gunsbach," Schweitzer relates, "that I attribute my first interest in missions. On the first Sunday of every month my father held a missionary service at which he told us about the life and work of missionaries. Once for many Sundays in succession he read us the memoirs of Mr. Casalis, a missionary to the Basutos of South Africa, which my father had translated from French for this very purpose. These made a great impression on me. . . "

The book that so impressed the young listener was *Mes Souvenirs*, by Eugène Casalis (1812-1891), first published in 1883; an English translation, entitled *My Life in Basuto Land* was issued in London in 1889. It is a most readable book, written with considerable literary skill, and one which can still stir the imagination. As a young man of barely twenty-one, Casalis, with two companions, established in 1833 the first Christian mission among the Basutos of South Africa and labored there for some twenty-three years before returning definitively to Europe. Although his volume of *Souvenirs* is devoted mainly to the story of the establishment of this mission to the Basutos (he had earlier published other books on the subject), there is much of interest besides: glimpses of his childhood in southern France, his student days in Paris, a picture of Capetown and the mentality of white South Africans in the 1830's, as well as striking descriptions of animal life in this part of Africa.

Casalis's narrative is characterized by sincerity and forthrightness, by modesty and moderation; it is not without its touches of humor, and conveys a general impression of serenity. Indeed, the general tone of the book is perhaps as significant as its graphic details about Africa. Schweitzer mentions (*Out of My Life and Thought*, Chapter 9) that, when laying plans for his hospital in Africa, one of the reasons that led him to seek the cooperation of the Paris Missionary Society (the Société des Missions Evangéliques), rather than some other organization, was that his father entertained a special sympathy for this Society and "particularly appreciated the fact that Casalis and others among its leading missionaries used in their reports not the honeyed language of Canaan, but that of the simple Christian heart."

"In addition to Casalis," Schweitzer further relates, "it was the sculptor Bartholdi, a

native of Colmar and creator of the Statue of Liberty in New York, who turned my childish dreams towards far horizons. On the monument in honor of Admiral Bruat, standing in the Champ de Mars at Colmar, he carved in stone a negro who is certainly one of the most moving creations of his chisel: a Herculean figure, with a sad and thoughtful face. I was greatly impressed by this negro. Every time we went to Colmar I sought an opportunity to gaze upon him. His brow spoke to me of the sufferings of the dark continent. . ."

Schweitzer refers to the statue of Admiral Bruat (1796-1855), a native of Colmar who had roamed the seven seas, served gloriously in the French Navy at the time of the Crimean War and died during the return voyage home. The statue by Frédéric-Auguste Bartholdi (1834–1894) was inaugurated in 1864. At the base of the pedestal supporting the figure of Admiral Bruat was a fountain at the corners of which were allegorical figures representing the traditional four parts of the world—including, for Africa, the negro who so touched the imagination of the little boy from Gunsbach.

The Admiral Bruat monument continued to ornament the public square of Colmar until September 1940, at which time, during World War II, it was pulled down by the Nazi Occupation forces as part of their "culture" campaign to rid Alsace of French influence. The destruction, however, was not complete, and thanks to the bargaining power of cigarettes, local patriots managed to acquire from the Nazi soldiers some fragmentary pieces of the monument, including the head of the negro. Furthermore, although the Nazi Gauleiter presumably was not aware of it, a plaster cast of Bartholdi's negro was in Dr. Schweitzer's house at Gunsbach—as it still is today. "It was while sailing along the African coast for the first time, in 1913," Dr. Schweitzer has written, "that I discovered the race of Herculean blacks, one of whose representatives must have posed as a model for Bartholdi; this race inhabits the region of the Ivory Coast." (*Mes Souvenirs du Vieux Colmar*).*

It was in 1904, while teaching theology in Strasbourg and pursuing his musical activities, that Schweitzer made the decision to go to Africa. He has related in *Out of My Life and Thought* how he found one morning on his desk "one of the green-covered magazines in which the Paris Missionary Society reported each month on its activities [*Journal des Missions Evangéliques*] . . . I mechanically opened this magazine . . . and my eye caught the title of an article, "[Henry Chapuis et Les Besoins de la Mission du Congo" (Henry Chapuis and the Needs of the Congo Mission)]. It was by Alfred Boegner, the President of the Paris Missionary Society, an Alsatian, and contained a complaint that the mission had not enough workers to carry on its work in Gaboon, the northern province of the Congo Colony. The writer expressed his hope that this appeal would bring some of those 'on whom the Master's eyes already rested' to a decision to offer themselves for this urgent work. The conclusion ran: 'Des hommes que sachent, sur un geste du Roi, dire: "Maître, je pars," voilà ce dont l' Eglise a besoin.' (Men who can say, at a sign from the King, 'Master, I go forth,' that is what the Church needs.) . . . Having finished the article, I quietly resumed my work. My search was over."

Seven years later, in 1913, Schweitzer left for Gaboon, where he established his first hospital at the mission station maintained there by the Société des Missions Evangéliques —the same Paris Missionary Society in whose journal he had read the appeal and under whose auspices, eighty years earlier, Eugène Casalis had gone forth to Basutoland. Although Schweitzer went out to Africa under the auspices of the Society, he went at his own expense, and not, strictly speaking, as a missionary. Thus, as he later wrote, "I acted in symbiosis, to use a biological term, with the

* The Admiral Bruat monument at Colmar has recently been reconstructed, but this modernized version, I am told, is considerably changed from the older monument that Schweitzer knew in his childhood.

Society, but my work was in itself supra-denominational and international. I was convinced, and I remain so, that any humanitarian task in colonial territory concerns not governments and religious organizations alone, but is the responsibility of humanity itself." (*On the Edge of the Primeval Forest*, Chapter 1).

Having made his decision to go to Africa—and as a doctor—Schweitzer thereupon began his preparation for the task by beginning his medical studies in 1905, at the age of thirty. In the autumn of 1911 he passed the state medical examination—paying the fee with money that he earned from a concert in Munich, at which he had played the organ accompaniment to the *Symphonia Sacra* composed by his French friend, Charles-Marie Widor. He still had his internship to accomplish and a thesis to write. The thesis which gained for Schweitzer his Doctorate in Medicine at the University of Strasbourg—where he had previously earned a degree in Philosophy and another in Theology—was presented and accepted early in 1913.

Schweitzer's "inaugural dissertation," strictly speaking, was printed at Tübingen, under the title, *Kritik der von medizinischer Seite veröffentlichen Pathographien über Jesus* (Fig. 1). It was subsequently *published* (a fine distinction for the benefit of the bibliographically-minded!) that same year by the firm of Mohr of Tübingen, with a few revisions, in the form of a 46-page booklet entitled *Die psychiatrische Beurteilung Jesu, Darstellung und Kritik*. The title has been rendered in English by an American translator (Charles R. Joy) as "The Psychiatric Study of Jesus, Exposition and Criticism," and, less literally but perhaps more subtly, by another hand, as "The Sanity of the Eschatalogical Jesus" (W. Montgomery, in *The Expositor*, Oct., Nov., Dec. 1913).

At first glance this appears to be a rather curious subject for a medical thesis—unusual, to say the least. It is necessary to recall, therefore, that as an historical scholar and teacher in the field of New Testament studies Schweitzer had already published the book known in English translation as *The Quest of*

Kritik
der
von mediziniſcher Seite veröffentlichten
Pathographien über Jeſus.

Inaugural-Diſſertation
zur
Erlangung der Doktorwürde
der
hohen mediziniſchen Fakultät
der
Kaiſer-Wilhelms-Univerſität zu Straßburg i. E.
vorgelegt von
Albert Schweitzer,
approbierter Arzt aus Kayſersberg.

Tübingen
Druck von H. Laupp jr
1913.

Fig. 1. Schewitzer's medical thesis presented at the University of Strasbourg, 1913. (Courtesy of the Bibliothèque Nationale et Universitaire de Strasbourg).

the Historical Jesus. This might be described as a "history of the histories of Jesus;" it is an historical survey of what scholars from the 17th century to Schweitzer's own time had written about the life of Jesus and of their attempts to place him in his historical background. The thesis submitted for the doctorate in medicine was really a continuation of these studies, and a substantial footnote to the earlier book. Since he had carried on studies in both historical theology and in medicine Schweitzer now undertook to examine, both as an historian and as a doctor, those books which had attempted a psychiatric interpretation of Jesus, treating him as a mentally abnormal person, a para-

noiac, an ecstatic, or even an epileptic; chief among these were works by a German, George Lomer, by the French writer, Binet-Sanglé, and by an American, Dr. William Hirsch. The gist of Schweitzer's conclusions is that these authors have incorrectly interpreted certain of the acts and utterances of Jesus as pathological symptoms because they are insufficiently informed about the historical world in which Jesus lived and the thought of his contemporaries. For those who may be interested, Charles R. Joy's translation of Schweitzer's little book is readily available in a paperback edition (Beacon Paperback No. 56).

With the completion of this thesis Schweitzer was a doctor on three counts: of philosophy, of theology, and of medicine. In the spring of 1913, at the age of thirty-eight, he left for Africa with his wife Hélène Bresslau, the daughter of a Strasbourg professor, whom he had married not long before. His first report from Lambaréné, covering the period April–July 1913, appeared, appropriately enough, in the September 1913 issue of that same *Journal des Missions Evangéliques* which had earlier transmitted to him the "call" to Africa. In the files of this *Journal* one can also find reports from the Gaboon missionaries mentioning, in most appreciative terms, the arrival of Dr. and Mrs. Schweitzer—and, in the December 1913 issue, what must be the first of the subsequent hundreds of published pictures of the Doctor in Africa! (Fig. 2). The photograph was taken in July 1913 at Samkita, a station some sixty miles up the Ogowe from Lambaréné, where Schweitzer had journeyed to attend a conference of the Missionaries working in the region.

Schweitzer's report was also published in more extended form at Strasbourg, as a pamphlet, in a German and in a French edition, for distribution among those friends who had contributed to his undertaking. This, then, is the first of the long series of reports from Lambaréné extending over a period of what will soon be fifty years. The substance of this report and of the two that followed in 1913 and 1914 was incorporated by Schweitzer into a book published in 1921, after the hiatus of

FIG. 2. Dr. Schweitzer in Africa, July 1913. From the *Journal des Missions Evangéliques*, December 1913 issue.

World War I, which tragically interrupted his work: the book known as *Zwischen Wasser und Urwald*, in French as *A l'Orée de la Forêt Vierge*, and in English as *On the Edge of the Primeval Forest*—a book that is still being re-issued and being translated into new languages.

In a fresh preface which Schweitzer wrote for a new edition published in France ten years ago, in 1952—and which I have not seen elsewhere—he remarked that the period described in the book had already become history, and added, in what appears to be a good-natured thrust at some of his critics, that this account of his first sojourn at Lambaréné might be considered "a modest monument dedicated to the period when colonies were still colonies." "Those events which constitute the course of historic evolution," and which, as Schweitzer has written, "are to their contemporaries unfathomable in their origins and incalculable in their effects," have unfolded rapidly indeed during the past decade. Today, Dr. Schweitzer's portrait ornaments postage stamps of the recently established République Gabonaise (Fig. 3).

It is merely stating the obvious to remark that Dr. Schweitzer has a sense of history—and thus of perspective on himself and his activities—even though all of his latter-day admirers and critics do not. Describing the beginnings of his work in Africa, he notes in *Out of My Life and Thought*: "Great was the joy of Dr. Nassau, the aged founder of the mission station at Lambaréné, when I sent to him in America the news that it was once more supplied with a doctor."

FIG. 3. Postage stamp issued by the République Gabonaise (established in 1960).

The reference is to Dr. Robert Hamill Nassau (1835–1921), a Pennsylvanian who was born in Montgomery Square near Norristown. He graduated from "Nassau Hall" at Princeton in the Class of 1854, from the Princeton Theological Seminary in 1859, and then earned his degree of Doctor of Medicine from the University of Pennsylvania in 1861. Dr. Nassau established a mission at Lambaréné under the auspices of the Presbyterian Board of Foreign Missions in 1874, and served in this region until 1891, when responsibility for the Protestant mission there passed to the Paris Société des Missions Evangéliques; Nassau was unable (or unwilling) to meet the French government ruling that French should be the language of instruction in the mission schools. He, however, resumed his activities elsewhere in Africa, outside the French protectorate, retired "from the field" in 1906, and spent the latter years of his life at Ambler, Pennsylvania, until his death there in 1921 at the age of eighty-six.

Among his many publications is the book published in 1914: *My Ogowe: Being a Narrative of Daily Incidents During Sixteen Years in Equatorial West Africa*. It is a rather formidable book of 708 pages, a day-to-day journal of Nassau's early years at Lambaréné and vicinity. It still has much to tell of conditions in Africa during the 1870's and 1880's, but is perhaps more than anything else the self-portrait of an early medical missionary—an energetic, tireless, tormented, and somewhat cantankerous man. Certain pages might supply material for a rather grim psychological novel, or for a doctoral dissertation in the manner of Schweitzer's "The Psychiatric Study of Jesus." In inviting you to investigate for yourselves this curious book, I do not wish to imply that Dr. Nassau is an unknown person. There is an article on him in the *Dictionary of American Biography*; he was well-known in his day, especially in Philadelphia, and there are

many older-generation Philadelphians who have vivid recollections of him.* During his long career in Africa he tirelessly gathered materials for his friends at home: a gorilla brain for Dr. Thomas G. Morton's studies in comparative anatomy, plants for Horticultural Hall in Fairmount Park, and countless boxes of specimens for the Academy of Sciences and for the University of Pennsylvania Museum—the listing, packing, and shipping of which he painstakingly oversaw. I have not attempted to identify any of these specimens, but I have recently seen in the Natural History Museum at Princeton some of the African artifacts presented long ago by Dr. Nassau. The snakes pickled in alcohol have, I believe, been discarded, there being occasions when even the historically-minded museum curator must compromise with Clio.

Since Dr. Nassau left Lambaréné in 1891 because of what he calls "difficulties with the French government," it is pleasant to read as an epilogue to his book, *My Ogowe*, that when he made a farewell visit to the region in 1906 the French missionaries there converted the visit "into a continuous ovation." The last sentence of Dr. Nassau's book (published in 1914) reads: "That mission is successfully carried on by my French successors, who, with rare courtesy, unselfishly recognize *my* almost seventeen years of foundation work for *their* Ogowe" [Italics mine]. It must have been at about the time he wrote that sentence, or shortly thereafter, that the aging and mellowing Dr. Nassau received the news that the Lambaréné mission station was again supplied with a doctor in the person of Albert Schweitzer. "Great", indeed, must have been his joy, as Dr. Schweitzer has recorded.

In recalling the name and writings of Dr. Nassau, I have of course had in mind the fact that Africa and African problems are much in the public eye here in America today. Much is being said about the "emerging nations" of Africa—and rather less about those from the not-so-remote past who have helped prepare this "emergence." May I even suggest that the "Peace Corps" is not necessarily new, or peculiarly American in concept? Be that as it may, I can at least pass on one of the results of my own bibliographical wanderings. To a person interested in the "new" nations of Africa or in other parts of the world, and seeking to acquire historical perspective, there is still to be found much of interest and perhaps even of current pertinence in the personal reminiscences of men like Eugène Casalis and Robert Hamill Nassau—so different in temperament—or in the files of such periodicals as the *Journal des Missions Evangéliques* and its numerous counterparts in other western languages.

These digressions suggested by Dr. Schweitzer's early writings having led us at length to Africa, and, in the person of Dr. Nassau, back here to Philadelphia, let me conclude them by returning to my starting-point in Alsace. In *Out of My Life and Thought* (Chapter 2, English-language edition) Dr. Schweitzer mentions that for a short time in the summer of 1898, after having completed his theological examination and while pursuing his studies in philosophy, he lived in the same house in which Goethe had lived while he was a student at Strasbourg. This is the house still standing in the "Old Fish Market" (36, Rue du Vieux-Marché-aux-Poissons), in the shadow of the cathedral, and which narrowly escaped destruction in the aerial bombardments of August 1944. A small medallion recalls the fact that Goethe lodged here in 1770. It was the following year, 1771, that he passed his examination at the University. Goethe himself has written of his sojourn in Strasbourg in his *Aus Meinem Leben, Dichtung und Wahrheit.*

The title of Schweitzer's autobiographical *Aus Meinem Leben und Denken* echoes that of Goethe's famous book, and indeed there are

* A recent review of the life and work of Schweitzer's predecessor at Lambaréné is by Fred B. Rogers: *Robert Hamill Nassau (1835–1921): Apostle to Africa.* Transactions & Studies of the College of Physicians of Philadelphia **30**: 150–156, January, 1963.

many other analogies between the two men. Upon numerous occasions Dr. Schweitzer has spoken of his illustrious predecessor—for example, in the address given at the Goethe bicentennial colloquium held at Aspen, Colorado, in 1949. Goethe, it might therefore be said, supplied the pretext for Dr. Schweitzer's first and only visit to the United States. Schweitzer's occasional essays on Goethe, those "conversations with Goethe," as he calls them, and which form part of his own quest for a philosophy of life, have been printed and collected in several forms (a bibliographical intricacy which I shall not attempt to untangle here). From the introduction to one such volume, edited by Charles R. Joy under the title *Goethe, Five Studies* (1961, Beacon Paperback No. 116), I extract the following from a letter written by Dr. Schweitzer to his editor:

"Goethe is the personality with whom I have been most deeply concerned. St. Paul, who, I think, has had a decisive influence upon me, belongs to an epoch too far away and too different from our own. The details of his life are too little known for me to converse with him and commune with him, as I can with Goethe, who seems to me so alive even in the contradictory facts, autobiographical and quasiautobiographical, that we possess about him. What attracts me is that he is a man of action at the same time that he is a poet, a thinker, and in certain domains a scholar and man of research. And what binds us together in the deepest depths of our beings is his philosophy of nature."

In one of Schweitzer's conversations with Goethe (the article "Goethe penseur" first published in 1932 in the French magazine *L'Europe*) there is this sentence:

"The ethical thinking of Goethe is completely expressed in the fact that Wilhelm Meister, the character into which Goethe has put the most of his own personality, is led by his inner experiences and by the circumstances of his life to devote himself to his fellows and to offer his services as a surgeon to the emigrants."

Turning now to Goethe's *Wilhelm Meister's Travels* (Book II, Chapter 11), here, by way of conclusion to my own digressions, is a passage which Schweitzer must often have pondered:

" 'You are one of that sort of men,' he said, 'who easily grow accustomed to a place, but not to an occupation. To all such a restless state of life is prescribed, in order, perhaps, that they may attain to a surer manner of life. If you will devote yourself in earnest to the most divine of all employments, to heal without miracles, and to perform miracles without words, I will use my influence in your favor' . . . ."

Walt Whitman's Physicians in Camden[1]

By HAROLD D. BARNSHAW, M.D.[2]

WALT Whitman was born in West Hills, Long Island, on May 31, 1819. The Quaker family moved to Brooklyn, New York, in 1823. Here he received his schooling and worked as a printer and journalist. In 1862, at the age of forty-three, Whitman travelled to Fredericksburg, Virginia, to nurse his wounded brother George. He became interested in this field of duty and followed the Army, administering to the sick for three years. While helping a surgeon amputate a gangrenous extremity, his arm was infected and he became critically ill. It was felt that this infection had much to do with his later ill-health. This may be true, but we also know that Whitman had a family history of tuberculosis. In 1873, he was stricken with paralysis in Washington, D. C., and started for the seashore to recuperate. He "broke down badly" in Philadelphia. Since his mother and brother George were living in Camden, he settled with them and remained there for ten years. Whitman was not the best house guest, sleeping late and requesting his meals at odd hours. In 1884 he bought a frame house at 328 (now 330) Mickle Street; this house, now a State Historic Site, was his home until his death in 1892.

While living in Camden, Walt Whitman had several doctors in attendance. He was first treated by a Dr. Grier, then the famous Dr. Osler, followed by Dr. Longaker and Dr. MacAlister. Other doctors were called in as consultants. There was a Dr. Walsh, about whom I could find nothing. A reference in Traubel was made to this doctor's brother, William, who was employed by Lippincott Company. I contacted this publishing company and was informed that their records for these years had been destroyed by fire. It is general knowledge that Dr. S. Weir Mitchell attended Walt Whitman, but I could not find any written reference to this fact. Dr. John K. Mitchell, Weir Mitchell's son, was called in consultation by Osler. Whitman spoke only of Weir Mitchell's writings. Dr. R. Maurice Bucke of Montreal, Canada, a good friend, advised the poet about his health and suggested doctors, but he did not treat him personally.

Dr. Matthew J. Grier was born in 1838 and died in 1900. The poet had been referred to Dr. Grier by Dr. W. B. Drinkard, who had treated him in Washington. (Josiah Trent mentions that Whitman had visited Grier's office at 312 South 12th Street, Philadelphia, several times.) Walt Whitman stated after one visit to Grier's office: "He reiterated his theory that my sufferings come nearly all together from gastric, intestinal, non-excretory, etc., causing flatulence, a very great distention of the colon, filling of passages, weight on valves, crowding and pressing organs (heart, lung, etc.), and the very great distress & pain I have under breast left side, pit of stomach, & thence to my head, the last month. Advised me by all means to begin the use of injecture syringe. Was favorable to my whiskey, advised asafatida pills." Dr. Grier attained notoriety through the treatment of nervous diseases by electricity. He wrote a paper on the treatment of sexual debility by electricity. He was a Fellow of the College of Physicians of Philadelphia and a member of leading clubs in that city.

The next doctor to treat Walt Whitman was Dr. William Osler. Dr. R. Maurice Bucke of London, Ontario, requested that Osler visit Walt Whitman in Camden. Osler had heard Dr. Bucke talk about Walt Whitman while at a meeting in Montreal. Osler was much impressed by Bucke's devotion to Walt Whitman

[1] Read before the Section on Medical History, The College of Physicians of Philadelphia, 8 October 1963.

[2] Historian to Camden County Medical Society, Camden, New Jersey.

and his teachings. Bucke was a fervent disciple of Whitman and felt that *Leaves of Grass* had meant much to him and his philosophy of life. Osler accordingly visited the "good gray poet" in his Camden home. He was impressed with the clutter of Whitman's room. It was piled high with papers, books and correspondence. Whitman sat in the center of this chaos, a huge bearded man. Osler found him in fairly good health. On Osler's return to Philadelphia he obtained a copy of *Leaves of Grass* and attempted to read it. He found it "not for my pampered palate, accustomed to Plato, Shakespeare, Shelley and Keats." Evidently, he must have read more of Whitman because later, while at Oxford, he gave several lectures on Walt Whitman.

Sir William Osler is well known to most of us through his biography by Harvey Cushing. We are well aware of his meteoric rise from a Canadian farm boy to an Oxford professor and a peer of the British Empire. He was a truly remarkable man and to read about him is to relive the period of his lifetime (1849–1919). Dr. Osler visited Walt Whitman sometime in 1886 and treated him until he left Philadelphia to become Professor of Medicine at The Johns Hopkins University in 1890. In 1913, Osler addressed the Yale University student body; the title of his address was "A Way of Life" and in it he referred to Whitman. The following is an excerpt from this essay. "I do not care what you think, I am simply giving you a philosophy of life that I have found helpful in my work, useful in my play. Walt Whitman, whose physician I was for some years, never spoke to me much of his poems, though occasionally he would make a quotation; but I remember late one summer afternoon as we sat in the window of his little house in Camden there passed a group of workmen whom he greeted in his usual friendly way. And then he said: 'Ah, the glory of the day's work, whether with hand or brain! I have tried *To exalt the present and the real, to teach the average man the glory of his daily work or trade.*' In this way of life each one of you may learn to drive the straight furrow and to come to the true measure of a man."

Following Osler, Dr. Longaker was requested by Whitman's friend Horace Traubel to visit Walt Whitman and treat him. Dr. Daniel Longaker first visited Whitman in the early part of 1891. At that time he found him aged beyond his years. There was, he noted, arteriosclerotic degeneration of the radial and temporal arteries. Walt's locomotion was very difficult. Whitman claimed that while he had not been a total abstainer, his habits were temperate, he did not use tobacco and had never had any venereal disease. Walt had trouble with his bowel evacuation and also with passing his urine. He was able to catheterize himself and did it when necessary for relief. We are indebted to Dr. Longaker for a vivid description of Walt Whitman's last illness and death and also for an account of his autopsy.

Whitman was taken seriously ill on December 17, 1891 with congestion of the lungs. His illness is graphically described, but little indication is given of any treatment. The attending physicians were suspicious of fluid in the pleural cavity. Whitman evidently suffered much pain during his last illness but was a good patient and complained little. He died on March 26, 1892, around 6 P.M. Before his death he had agreed to a post-mortem examination. The autopsy was performed by Dr. Henry W. Cattell, demonstrator of Gross Morbid Anatomy, University of Pennsylvania, in the presence of Dr. Daniel Longaker, Prof. Francis X. Dercum, Dr. Alexander MacAlister and Horace L. Traubel. The brain was removed first by Professor Dercum and was thoroughly examined.* No explanation was given, however, for the cause of the paralysis which dated from

* Whitman's brain was supposed to go to the Anthropometric Society. No trace, however, has been found of it. The Wistar Institute of Anatomy in Philadelphia has no record of receiving Whitman's brain. It is reputed to have been destroyed when an attendant carrying a tray of brains tripped at the Wistar Institute! As Masters states concerning the incident, "it is probably not important."

the time he had nursed sick soldiers in the Civil War. Necropsy revealed an abscess of the sternum and one of the ribs. These were 'cold' or tuberculous abscesses. The intestines and other organs of the abdomen were covered with tubercles. Walt Whitman died of diffuse miliary tuberculosis. The doctors excused themselves for not making the diagnosis, especially of the abscesses, prior to death, since their patient did not wish to be moved because of the amount of pain it caused him.

Dr. Daniel Longaker was born in 1858 and died in 1949. He graduated from the Philadelphia College of Pharmacy in 1879 and from the University of Pennsylvania School of Medicine in 1881. He was at one time professor of Obstetrics at the Jefferson Medical College and belonged to the College of Physicians of Philadelphia and many other societies. He was interested in caesarean section and in 1890, in a farm house near Doylestown, Pennsylvania, performed his first caesarean operation, one of the first in this area. It resulted in a living child and mother. It is interesting to note that in Dr. Lewis C. Scheffey's Memoir of Dr. Longaker he did not cite him as having been one of Walt Whitman's doctors. This was probably because Longaker was a reserved man and never made much of this episode in his life. Certainly, being physican to Walt Whitman and writing of his last illness should bring him more fame than many of his other accomplishments.

Dr. Alexander MacAlister was Whitman's local physician. MacAlister was born in 1862 and died in 1938. He was a graduate of the Philadelphia College of Pharmacy in 1882, and of the University of Pennsylvania School of Medicine in 1885. An intern at the Pennsylvania Hospital, his subsequent practice was both general and surgical. He served on the staff of the Cooper Hospital and the West Jersey Hospital. At one time he was president of the Camden Medical Society and served on many boards and societies in Philadelphia and in Camden. Dr. MacAlister was the first local doctor to use diphtheria antitoxin in the treatment of this disease. This brought him much fame and also was the cause of his being censored by the Camden County Medical Society. It seems as though Dr. MacAlister may have been over zealous in the advertising of his successful use of diphtheria antitoxin. It also appears that the society membership may have been a bit jealous of his success with the antitoxin.

From the study of the last years of Walt Whitman's life it is apparent that Dr. MacAlister was his personal physician. He attended him constantly during his last illness and was the only doctor in attendance at his death. Also present at Walt Whitman's death were Mrs. Davis, Mr. Traubel, Mr. Fritzinger, and Mr. Harned.* Dr. MacAlister was also present at Walt Whitman's autopsy. He wrote and filed Walt Whitman's death certificate. I could not locate this document at Trenton, New Jersey, but received a written copy of it from his son, Mr. Paul MacAlister, of Chicago, Illinois. This death certificate has not been published before. It was as follows:

Report of Death

1. Walt Whitman
2. Age—72 yrs. 9 mos. 26 days
3. White—poet
4. Single
5. Born—New York
6. Residence: 328 Mickle St., Camden, N. J.
7. Resident in state 19 years.
8. Died: 328 Mickle St.
9. Father's Name: Walter Whitman, born U.S.A.
10. Mother: Louisa Whitman, born U.S.A.
11. Died March 26, 1892 of Pneumonia-Secondary: tuberculosis, general miliary;

* Notice of Whitman's death written on brown paper and posted on the door of 328 Mickle Street, March 27, 1892:

Whitman began sinking at 4:30 P.M. He continued to grow worse and died at 6:43 P.M. The end came peacefully. He was conscious until the last. There were present at the bedside when he died Mrs. Davis, Warren Fritzinger, Thos. B. Harned, Horace L. Traubel and myself.

Alex. MacAlister

mode of death: respiratory failure
Length of sickness: 3 months
Undertaker: Fithian Simmons.

Study of the lives of these capable physicians has given me indirectly a greater appreciation of Walt Whitman. If he was admired and respected by these men he must have had a forceful and loving personality. It has also brought me the realization that Walt Whitman was a true lover of people and of his country, portrayed so dynamically in his writings.

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Extinct Medical Schools of Nineteenth Century Philadelphia: (VI.) The Eclectic Medical College of Philadelpia and Philadelphia University of Medicine and Surgery

By HAROLD J. ABRAHAMS, PH.D.

IT HAS been said that the macrocosm and the microcosm bear the strongest resemblances to each other. As our bleeding nation clawed at itself, locked in fratricidal combat, medical circles in Philadelphia were witness to another internecine struggle—that in the domain of the two Eclectic schools, with the shot and shell of pen and ink, leaving, for a time, both heads bloody but unbowed. Just as, on a larger scale, wars between nations are apt to be followed by Pyrrhic victory, so did the struggle between the two colleges eventually conclude with the extinction of both in the brief years after the Civil War.

The story of the founding of the Eclectic Medical College of Philadelphia begins with the disagreement between Dr. William F. Smith (and the Middle States Reformed Medical Society, which had assisted in establishing the Eclectic Medical College of Pennsylvania), on the one hand, and the Eclectic College on the other. In 1853 the Society obtained a charter from the Legislature for "The American College of Medicine", thus setting up a rival school. A session was conducted in 1853–54, from which twenty-nine men were graduated. Friction between the Society and the Eclectic Medical College was then adjusted, whereupon the young rival school ceased to operate. We have already seen how Drs. Paine and McClintock had separated from the Eclectic Medical College of Pennsylvania in February, 1860. A charter was obtained by the device of reviving the American College of Medicine, and securing an amendment, dated February 15th, 1860, from the Legislature, which gave the college a new name: "The American College of Medicine in Pennsylvania and the Eclectic Medical College of Philadelphia".

The new school showed much promise. William Paine supplied energetic and very able professional and financial leadership, his associates on the faculty being teachers and scholars of high reputation and accomplishment.

On October 24, 1860 Dr. McClintock, in an "Introductory Lecture" expressed the opinion that "the effort to establish in this city of medical fogyism a school of liberal principles, untrammelled by the dogmas of any creed ... is no longer an experiment or a matter of doubt ... the medical men of the land ... have risen in their might and determined to be free to avail themselves of all the means a bountiful and merciful Creator has placed within their reach to ameliorate the pains and distress of suffering humanity."

Dr. McClintock makes a list of the many medical sects which have appeared since ancient times, then concentrates upon the three contemporary classes of physicians: Allopathists, Homoeopathists and Eclectics. He says that he was reared in the strictest faith of the Allopathists, and had both practiced its principles as faithfully as possible for a long time and taught its doctrines in nearly all the branches of medical study, attaining as high position as even a vain man might have wished. But he cannot accede that Allopathists have accumulated all the medical knowledge that thus far can be acquired, and now nearly approach perfection. Indeed, their principles and practice have changed so often that one can scarcely call them scientific.

He prefers not to devote time to a discussion

of Homoeopathy and instead, hurries on to an eighteen point explanation of Eclecticism, which he thinks, approaches "more nearly to scientific accuracy, than any other school." His arguments are too familiar by now to deserve repetition here. Suffice it to say that he pleads for a union of the two extremes: the facts of the ultra-conservative and the researches of the fanatical reformer, and he emphasizes the need of not only passing through the ordinary and preliminary course of study, but, in addition, of devoting much time and attention to investigating all the therapeutic resources of every school, of the profession. For the past twenty years he has felt strong leanings to Eclecticism, and is now thankful that he has joined the ranks. For this he expected to be called a quack, and was not disappointed. But that does not worry him. Was not Jenner threatened with disgrace, because of his silly visionary idea of vaccination? And was not Harvey, for discovering the circulation of the blood, deprived of his practice and driven into exile? " . . . not one of his contemporaries of the age of 40 years, when Harvey made known his discovery, ever conceded its correctness. They were stable-minded men and despised to be lead astray, like boys, by the glare of novelties."

Dr. McClintock went on to say that this school taught a course of scientific practice, based upon a knowledge of structure, function and pathology, with all possible information on materia medica and best views on therapeutics based on the most reliable experience and observation of practitioners of all schools. The system followed was that of a positive medical practice, founded on true philosophical principles and not on fine-spun speculations or dogmas handed down from one generation to another by virtue of the authority of great names, ancient or modern. He reviewed certain facts about the history of the Medical Department of Pennsylvania College, Jefferson Medical College, and the Philadelphia College of Medicine (in the founding of which he had played the key role), "in order to illustrate the selfishness, tyranny and persecuting spirit of some of the practitioners of the old school," in opposing the rise of these new schools, and he wondered if the facts might cause his hearers to conclude that some of the medical schools worked not in "perfect love and amity" but more like:

> "A base pack of yelping hounds,
> who wish their betters to annoy,
> If a stray cur enter their bounds,
> Will bruise and mangle and destroy;
> So they will on some plan unite,
> By which to vex him and to spite:
> His very virtues they will use
> As pretexts for their foul abuse."

He continued with an account of his many activities as teacher and practitioner, which make interesting reading for us of a later century—his pioneering at the Philadelphia School of Anatomy, the threats to one of Mc Clintock's students from the professor of anatomy of Jefferson, for studying with him, and finally, because of the fact that he "was not a hanger-on of any school nor attached to any clique," the attempt to crush this independent teacher: he had "difficulty in procuring the necessary subjects; students were told I had bodies in my rooms which had died of small pox; I was an irregular, and not much of a teacher." His cards (announcements?) were torn from the blackboards of the colleges and when he found out that the professor of anatomy was one of the guilty persons and called upon him to request an explanation, the professor told him that he had nearly emptied his dissecting room. The net effect of all this was that next year (1840) McClintock had a class of over two hundred, among them some of the most prominent physicians in this country. He related in this speech many other instances of the trickery and dishonorable conduct of other physicians toward him—efforts to take financial and professional advantage of him, to expel him from the American Medical Association in 1855, to block his appointment to the chair of anatomy at the University of Maryland and to the post of Chief Resident Physician of the Philadelphia Hospital, Lunatic Asylum and Alms House by a physician whom

he believed to be a friend. These dastardly things had been done by members of the "regular" profession. (Other professors in Allopathic colleges had supported him, be it also said.) He closed his Introductory Lecture by arguing that many prominent professors in the leading medical schools of the city had kept secret the ingredients of medicines which bore their names, but for being in the "medicine business" or engaging in the vending of so-called nostrums he was accused of having violated the Code of Ethics. This state of affairs caused him to hold a low opinion of allopaths in general, and by inference gave him an additional reason to join the Eclectics.

Dr. Paine, in early College announcements, declared that the Board of Trustees had determined to set up a national college, open to all, without distinction as to sect or party. One of the principal barriers to the advancement of medical practice was the inferiority of medical education, due to lack of good college buildings, equipment and competent teachers. Many ignorant men were pretending to give medical instruction and to represent the Eclectic profession, without themselves having had a proper medical education, thus not having a sound knowledge of the principles of Eclectic Medicine and Surgery. To remedy this disgraceful situation and to place medical practice upon a scientific basis the Trustees had bought an elegant college building and extensive apparatus and had "engaged a most thorough corps of medical instructors."

Despite these good intentions the school had encountered almost insurmountable obstacles, put in its way by both conservatives and reformers, the latter behaving like fanatical and visionary theorists. Desiring to erect an institution whose outlook would be broad, liberal and progressive, it at once identified itself with the great movement to advance and improve the practical condition of medicine, adopting essential improvements made by all classes of the profession, rejecting nothing which time and experience had shown "to be of value in curing disease." Research by the professors was encouraged, and the outcomes were new truths, more remedies, better methods of cure.

At one time it seemed desirable to allow itself to bear a distinguishing label and the school had therefore obtained a charter revision which added the word "Eclectic" to its name. Now, with the desired results already achieved, the friends of the College believe that the time has arrived when all sectarian lines should disappear. Pursuant to this philosophy, Dean Paine stated, in the College Journal for July, 1865, that his college "was the first to assume the initiative in discarding all sectarian names" and by legislative act had purged itself of all sectionalisms, thus striking off the chains which bound to a sect a great many of the most successful of our country's practitioners. All sects as such are absurd. True reformers saw the merits in each sect but wished not division, but union of all that was good. The purpose of the physician or the surgeon is to cure disease, never mind the particular theory. He should not be branded Allopath or Homoeopath, according as he prescribes a large or small dose of aconite. We should not attempt to define the boundaries of Eclecticism, since, in the practice of medicine all physicians (not only Eclectics) must choose and select, and to what extent a physician should do so should be a matter for him to decide. It is absurd to classify him as Eclectic, Allopath or Botanic, because of this meaningless difference. The College had therefore in March, 1865, obtained from the Pennsylvania Legislature the right to change its name to "The Philadelphia University of Medicine and Surgery." All that is known to the profession as new and valuable no matter from what source, will be taught, but, with no sectarian label to hobble the school, its graduates will receive a degree merely as physicians and surgeons, leaving with them the choice of selecting and practicing medicine according to the dictates of their conscience and knowledge. The College therefore welcomes all students, regardless of their future philosophies of medical practice. Medicine is an imperfect and progressive science, and since no sect or collection of sects has brought it to a fixed and perfect

system, not even all the world's collected respectable physicians have the right to claim infallibility "or to denounce others as irregular, heterodox or unworthy of professional courtesy." This College extends "courteous professional recognition to all honorable, educated physicians," whatever their opinons in therapeutics, and hopes for the day when others will assume the same attitude and put an end to the bickerings of Medical parties. The suppression of independent thought and rigid adherence to a certain standard system of practice has been a terrible brake on progress. The liberal position of this College makes it possible to teach its students a great deal of therapeutics and pathological science which would be denied them had the College not deviated from the standard authors. A larger and more valuable list of remedial agents then commonly used by the profession is presented to the students, and these remedies embrace improvements of intestimable importance to its graduates, enabling them to achieve curative results hitherto not possible. Nothing new is overlooked, nothing old is discarded until something better is at hand. The College therefore wants no part in the cramping attitude of sectarianism, rejoicing, instead, in the fact that it gives its graduates such "remarkable advantages in their preparation and resources for practice."

In an undated, sixteen page pamphlet, Pennsylvania Frauds! How State Officials Teach a Political Arithmetic, Dr. Paine reviews some of the tragic facts in the life of his school. He mentions his 1858 activities as editor and publisher of the Eclectic Medical Journal of Philadelphia and author of Epitome of Surgery, Midwifery and Materia Medica and in 1860, as author of New School Remedies. In 1863 the Trustees of his college purchased the property of the Penn Medical University, the Medical Department of the Pennsylvania College and The Philadelphia College of Medicine. The collective name (as we have already seen), became "The Philadelphia University of Medicine and Surgery" (the three schools named immediately above being suspended). The school prospered and Dr. Paine did likewise, his practice growing to more than "fifty thousand patients annually, including every form of medical and surgical disease." The new remedies effected astonishing cures and resulted in jealous assaults from both Old School and Eclectic sources. Until 1867 the opposition contented itself with false reports and the usual denouncements, but in that year the professors of the University of Pennsylvania joined their former enemies of the Eclectic Medical College of Pennsylvania and asked the Legislature to break up the Philadelphia University of Medicine and Surgery. Paine accuses "Professors Rogers, Stillé and Co., of the old regular University, and Professor Buchanan and Co., of the Eclectic School", of having his Trustees cited to appear to answer charges that the school was "teaching heresy and various other irregularities." The charges were dismissed as having obviously been motivated merely by transparent jealousy. The professors "returned to their trades very much chagrined, and evidently of the opinion that some other subterfuge would be required in order to obstruct the progress of a school that was so rapidly obtaining all their students, and monopolizing the best practice of the city and country." Paine then charges his enemies with evolving a scheme by which they hawked diplomas in the name of a newly chartered institution bearing a name so similar to that of his school that the ignominy could easily fall upon him and his Faculty—i.e. they instituted the American University of Philadelphia, "under the pretence that it was to be a colored school," then, by omitting the word "American," and transposing the words which remained, styled the school "The Philadelphia University," hoping thereby to lend credence to the report which they now circulated, that his school was connected with the diploma traffic. (They even deliberately designed the diploma to make it resemble that of the Philadelphia University of Medicine and Surgery.) The situation became sufficiently acute to prosecute the slanderers who had taken to publishing libelous articles in some of the

secular papers. Paine then tried to publicize the true state of affairs in his Philadelphia Journal of Medicine and Surgery, from whose pages we give below excerpts from the numbers of November, 1869, and February, 1870:

"SELLING DIPLOMAS

A libel, published in the Medical and Surgical Reporter, on the Philadelphia University of Medicine and Surgery, and which the editors retracted, when the strong arm of the law was placed before their obtuse intellects, has developed a fact to which we called the attention of the profession a long time ago; that is, that one or more of the medical schools is selling diplomas. When I saw in the Medical and Surgical Reporter, a few years since, the advertisement of a certain professor, L.L.D., etc., that he was acting as a general collegiate agent, and especially invited all students to call upon him, I suspected something wrong, but it was not until one of the students of the Philadelphia University of Medicine and Surgery bought a bogus diploma, and represented himself as a graduate of that University, that the Faculty deemed it proper to investigate the matter. This subject was fully noticed in the Journal at that time. During the past summer another case occurred which is stranger still. A young man from Massachusetts entered the Philadelphia University of Medicine and Surgery and remained one term. After returning home, he wrote to inquire whether he could not receive his diploma. Upon being informed that he could only obtain it when he had finished his medical studies, he sent to the city, and bought one for fifty dollars; at least, it is so stated by two students, now in attendance, from the same town.

As I am informed that this very man who advertised in the Medical and Surgical Reporter is one of the parties engaged in this business, will brothers Butler and Brinton explain to their readers how the thing is done? Cannot they make the Reporter pay, or what? We cannot believe that Dr. Brinton would add the bogus diploma business to Dr. Butler's real estate operations. A stop should be put to this traffic in medical deceptions, and it could be done effectually by establishing a central medical board, where all medical students should be required to present their diplomas, and pass a rigid examination in all branches of medicine and surgery before allowed to practice their profession. Make the standard high, and let all the pathies in the practice of medicine be represented, the same as in the Royal College of Physicians and Surgeons in Canada, and this traffic in diplomas will cease, as it would be of value to the student only as it indicated his medical acquirements. We presented this whole subject before the Board of Education of this State during the sessions of the Legislature two years ago, but the University of Pennsylvania and others refused to co-operate with us, and the subject was abandoned for the time, but we intend to renew our efforts during the present session, and by some means, if possible, end this disgraceful diploma trade."

February Number, 1870. "—Bogus Diplomas.—In the January number, we published a notice of a collegiate agency in Milwaukee, Wisconsin, which proposed to furnish diplomas from medical colleges and other educational institutions to such as needed them, simply as a matter of merchandise.

"Yesterday we received from another correspondent a card of a similar character, headed "Collegiate Agency," and signed, "Dr. A. J. Hale, No. 214 Jacoby Street, Philadelphia." Accompanying the card are three letters, written by Dr. Hale to one of his correspondents. In the first, he appears to furnish the diplomas conferring the degree of M.D., for $80, and A.M. for $50. In the second, the medical degree $50, and urges his supposed applicant to send in his full name to be entered at once in the diploma. The third letter is as follows—:

Philadelphia, Penn., November 23, 1869.

Dr. . Dear Sir:—Yours of the 19th instant to hand. Did not think it necessary to specify all the institutions conferring degrees. If you wish to apply to an Allopathic, I refer you to the Dean of one institution, the American University of Philadelphia, Professor John Buchanan, No. 225 North Twelfth Street. If you wish to apply to an Eclectic School, Eclectic Medical College of Pennsylvania, Professor Joseph Sites, Dean, 514 Pine Street, Philadelphia. Both schools regularly organized and chartered by the State Legislature, and honorable institutions. I refer you to the above named gentlemen for any further information in regard to the schools.

Very respectfully,

A. J. Hale, M.D., 214 Jacoby St. Phila.

"We think it quite evident that a systematic business of swindling, in the way of selling diplomas, has been carried on for some time in this country, with headquarters at Philadelphia. The Milwaukee concern is probably only a branch. Is it not time that efficient steps were taken to put an end to this swindling? The American University is a darkey concern, located—nowhere. It was not until this business had been carried on for a long time, that we became fully alive to the fact that a systematic effort was made by the enemies of the Philadelphia University of Medicine and Surgery, to issue these diplomas from the American University of Philadelphia, and to make the public believe they were from the Philadelphia University of Medicine and Surgery. An investigation soon discovered the fact that the Medical and Surgical Reporter, and other Old School

> Medical Journals had co-operated with this gang of diploma venders to sell the diplomas, and cast the odium upon our school. They, absolutely sent their agents to the Philadelphia University of Medicine and Surgery, to matriculate, and attend lectures, so as to become acquainted with the students, and induce them to take their diploma, and leave the school, informing them that their diploma so closely resembled ours, that no one could know the difference, and besides that no one outside of the city knew that there were more than two Universities here. In several instances they induced students to accept their propositions, leave the school, and practice by this trickery. They not only succeeded in making money, but also in injuring the Philadelphia University of Medicine and Surgery."

Paine devotes the rest of his pamphlet "Pennsylvania Frauds," pages 5–16 inclusive, to efforts by politicians and holders of high office in the State of Pennsylvania to do him great injury. The story includes such dramatic elements as filching his personal papers which he had hoped to use as evidence in a court of law, defamation of his "social and professional character," efforts to entice him to Harrisburg for criminal purposes, foisting upon him a prostitute who offered a large sum of money if he would produce an abortion, the offer of a lucrative position as a bribe for his silence plus the surrender of the incriminating evidence ("the Evans papers")[1] which he possessed, etc. These efforts to ruin him having failed, an effort was made to accuse him of agreeing to sell a diploma for a two year old baby. Finally an act was passed to annul the charter of Paine's College since all other attempts to ruin him had failed, but Justice Agnew, of the State Supreme Court, declared it to be without legislative force and void. The only charter which could be repealed was that of the American University of Philadelphia, because unlike that of the charter basic to the Philadelphia University of Medicine and Surgery (1853) it had been granted in 1867, years after the passage of the enabling amendment to the Constitution. Paine's enemies were aware of this fact but they had hopes of confusing the minds of the public by discrediting the American University of Philadephia, then identifying it with the Philadelphia University of Medicine and Surgery in the public mind and thus evoking so much popular contempt for him that anything which he might say or do would not be believed, and his destruction thus be assured. Paine and Evans alone knew the dangerous political secrets. Paine was given a thorough going-over by the press (partly venal, partly ignorant). Evans was bribed to absent himself until after the election. His head was shaved, then he was taken to a women's hospital out of New York, and passed off as a female, under guard of doctors, detectives and a host of politicians. Nevertheless some of the facts were given out by the New York Sun and other independent newspapers.

A further effort to ruin Paine took the form of threatening to declare his bail forfeited if he did not produce Evans for trial. (He could not do so, since Evans was in the hands of Paine's enemies at the moment.) Paine spent all the money available to him in trying to locate Evans, but failed to find him. In desperation he called upon the Governor, and threatened to summon and put on the stand every man connected with the War-Claims Fraud, while trying Evans in absentia. The Governor proposed adjournment of the case, to which Paine agreed. This ended the "bogus diploma excitement." Evans was "tried according to a special agreement between the parties."

The next year the mayor of Philadelphia,

[1] George O. Evans, "very ill" in a Harrisburg jail in August, 1871, had sent for Dr. Paine to treat him. When Paine arrived Evans disclosed to him that, as agent for the collection of three million dollars in War Claims owed the State of Pennsylvania by the federal government, he had received payment and paid over all of it, less his commissions (10 per cent), but that despite his having had to pay a large portion of his commission to persons who had assisted him in putting the claims through, these very men had taken to quarreling among themselves, because some had received more than others, and they were now trying to squeeze from him that which was rightfully his, profiting infinitely more than had he, who had actually performed the services. To defend himself against these evil-doers he would have to find someone to enter bail of $100,000 for his release. Paine signed the bond, on condition that Evans would place in his hands the pertinent papers, showing that the principal portion of the War-Claims money had been paid over to the State officials and others. In this manner Paine came into the possession of the strategic documents.

who still feared Paine, under pressure, before election time, of State politicians, sent a message to Council, requesting the Attorney General to issue a quo warranto against diploma vendors. Out went the alarm in the Evening Bulletin, Inquirer and other papers — "Bogus Diplomas from Paine's College." Paine then entered suit for libel, whereupon, after election day he received an apology and an explanation that it was the "American University" which was meant. He says that he is fully conscience of the transparency of this stratagem, that had it been anyone's intention to do injury to the American University, the easy way would have been to repeal its charter, that there really is no such thing as a bogus diploma, unless it be a forgery, for "a diploma is nothing more then a certificate of what a person thinks," and in nearly all parts of the United States a person "can practice medicine as well without one as with."

The final scene of the drama is a last effort to deliver a coup de grâce to Paine by bringing Evans to trial, accusing him of responsibility for as much of the frauds as had become public knowledge, then letting him escape, thus forfeiting Paine's bail. Paine was alerted by friends, and captured his man, delivering him to the Sheriff and demanded an exoneratum from the bail, thus becoming entirely relieved from any further responsibility. The result of all of this was the damage done by extensively circulated falsehoods, great financial loss and arrest of the sales of Paine's publications.

(Eventually, the Board of Trustees, learning that the desire of the Commonwealth was surrender of the charter "without prejudice or the imputation of any blamable act," and wishing to avoid a costly and profitless lawsuit, gave up the charter. It was no honorable victory or dishonorable defeat, for all that had been surrendered was the "right to manage a literary institution," in the words of the Honorable F. Carroll Brewster (of the Court of Appeals of New York), who later affirmed that a medical college was neither a scientific nor literary, but an eleemosynary institution. Paine insisted until his last day on earth that the surrender had no validity and that the University still had a legal existence. It will be recalled that Buchanan, quoted in number five of this series, claimed in his tirade that Paine never did hold any charters. Yet the fact that he encountered no resistance from alleged owners argues in Paine's favor. Thus did the days during which the school was really "itself" come to an end (1875). An institution bearing its name limped along for a time and was finally closed down as a diploma mill in 1880.

Necessarily brief as is this account of the troubled years which Paine spent as guiding genius of his school, it leaves a little space available for a presentation of his replies to the charges of John Buchanan, which were given at length in number five of this series. A few brief specimens taken from Paine's Journal,[2] must suffice:

"QUARRELLING QUACKS"

A few quarrelling quacks are most terribly exercised because we will not condescend to notice their base falsehoods. We have previously stated that we have more important business to attend to than to spend our time in discussing the merits of a few Thomsonian abortionists, or refuting the falsehoods, cogitated in lager beer shops, gambling and abortion houses." (Eclectic Medical Journal of Philadelphia, March, 1863, page 88.)

"Indeed, such has been the prosperity of the school and its rapidly increasing popularity, that it has excited the envy and jealousy of all the small colleges of our country. In some instances these petty schools have attempted to retard the progress and prosperity of the College, by the fabrication and circulation of base falsehoods. In most instances, however, these attacks have been made by parties destitute of either medical or social position. Hence they have neither merited nor received a consideration, either from the faculty or board of

[2] It will be recalled that in number five of this series it was pointed out that, under William Paine's editorship, this journal was known from 1858 until 1865 as The Eclectic Medical Journal of Philadelphia (Volumes 1–7) and from 1865 until 1871 (when it ceased to exist), as The Philadelphia University Journal of Medicine and Surgery, (Volumes 8–14).

instructors; nor have these attacks, in any way, interfered with the prosperity of the College. From present indications, the class will be much larger for the next season than that of any previous one" (July, 1863, page 231).

"Resolved, That of all men on earth quacks are the most pernicious, repulsive, and despicable to the community and intelligent physicians. We regret to say that the high and holy cause has been stained by the foul impostors who feign to teach its doctrines, near Sixth and Callowhill." [i.e. the Eclectic Medical College of Pennsylvania] (One, among various resolutions passed by the graduating class of January, 1864—Journal, March, 1864, page 135.)

I. BUILDINGS AND EQUIPMENT

The first home of the college was located on a site between Fourth and Fifth, and between Race and Cherry Streets. Though a small building, it was said to be well arranged for the purpose and easily accommodated the 114 matriculants during the session of 1860–61. It is described in the Eclectic Medical Journal for June, 1860 (pages 251 252) as a three story main building with a four story wing, and cupola. The main building had on the first floor a chemical lecture room, equipped with water, gas, pneumatic trough and all other necessary appurtenances, and capable of accommodating two hundred and fifty students. On the same floor there were "two other rooms suitable for a museum." On the second floor there was a room which could seat five hundred, devoted to lectures on theory and practice and to materia medica. The walls of this "fine" room were adorned with anatomical and pathological paintings. On the third floor there was an amphitheater which could seat from two hundred and fifty to three hundred persons. It had elevated seats, rotary table, and gas lights, and was used for instructions in anatomy, surgery and obstetrics. To the rear of the amphitheater there were two dissecting rooms, equipped with water, and other necessary conveniences. The first floor of the wing was used as a reading and writing room for students, the

THE
PHILADELPHIA UNIVERSITY OF MEDICINE AND SURGERY.
ERECTED 1852 COST OVER $50,000.
Located Ninth Street, below Walnut, two squares South of the Continental Hotel.
WM. PAINE, M.D., Dean of the Faculty

FIG. 1

second floor in part as a large lecture hall, in part as a pathological museum, the third floor as a museum of anatomy and surgery with models, paintings, etc., and the fourth floor as another dissecting room. The cupola was used by the janitor as a work shop, in which to clean bones and to make anatomical preparations.

On October 16, 1863, after eighteen months of negotiation, there was effected the purchase and transfer of the building erected by the Medical Department of Pennsylvania College at Ninth Street below Locust. It was claimed for this structure that "one of the first artists of the city" had been sent to Europe "to inspect the various medical institutions, and prepare a draught for a model medical college." The architect had also designed the Girard College structure. The building was erected "at the enormous expense of between fifty and sixty thousand dollars," according to one account and for ten thousand dollars less by another. It was sixty by eighty feet and stood five

stories high. The brownstone facade was Collegiate Gothic, and, with its embattlements and two eighty foot towers each terminating in embattled parapets, had a pleasing appearance. The structure was said to be one of the very best medical school buildings in this country, and the "finest collegiate building in the city." According to various accounts there were from forty-five to fifty-three rooms. There were three large lecture rooms for chemistry, anatomy and practical medicine. The anatomy and surgery amphitheater was one of the finest in the country. The Announcement of 1869–70 claims that it could seat nearly one thousand students. The main dissecting room was equipped with fifteen tables and with water, gas and all other "modern" facilities for practical anatomy and surgery. There were, in addition, eight private dissecting rooms, so that altogether there were ample facilities for one hundred and fifty students to carry on dissecting at one time. There was a spacious and elegant room whose cases and furnishing alone cost about three thousand dollars. The chemical laboratory had a furnace, pneumatic troughs and all apparatus for giving a completely detailed, modern course. The most seasoned and experienced of the city's physicians had assisted in making possible this nearly perfect and complete medical school building, in which neither pains nor expense had been spared to provide every facility and convenience. It had been completed in 1853. Because of the Civil War, so many of the students, who came for the most part from the South, had returned thence, and the Medical Department of Pennsylvania College had ceased to exist in 1861 as a result of which the building became available for purchase.[3] The Eclectic Medical College of Philadelphia took great pride in acquiring a building not alone so elegant and convenient, but also the building of one of the Allopaths' "most aristocratic and flourishing institutions." A College pamphlet, the probable date of which is 1874, states that, at the moment, the building was occupied by the University of Pennsylvania, which would leave it by the first of October. The Announcement for 1875–6 locates the building at Ninth Street below Walnut, not Locust, as previously, but such a location would be equally applicable to the building which has been described above, and the delineation of the building in the 1875 Announcement is virtually the same as given earlier. However we now find it stated that "there are lodging-rooms for about two hundred and fifty students in the edifice, affording them every modern comfort,—baths, heat, gas-light and a restaurant". . . presenting . . . a home abounding in every comfort and even luxury, genial society, and every appliance that can aid in the acquisition of knowledge, at a very moderate cost."

In March, 1878, the school was housed at 209 North Tenth Street, its last address. Under the deanship of T. B. Miller[4] the school, now a diploma mill, became extinct in 1880. This era in the life of the Philadelphia University of Medicine and Surgery will be dealt with in a future article.

The early statements of the College say very little of a specific or detailed nature about apparatus and teaching equipment, beyond the fact that it was "extensive" and that the museum was amply supplied with demonstration materials of the usual kind (osseous, nervous, vascular, muscular, ligamentous, etc., and wet preparations relating to surgery, pathology, obstetrics, diseased bones, calculi, wooden, plaster and wax models, paintings and

[3] Late in the year 1867, sale of 1000 shares of stock of the University was announced. One share was valued at $100, and the holder of ten shares was automatically a Trustee (entitled to one vote in the management and one scholarship per share, entitling one student to attend lectures until graduation.) Officers were to be elected annually. The stock was guaranteed by the real estate of the University.

[4] T. B. Miller, A.M., M.D., D.D., claimed to have the charters of the Penn Medical University and Philadelphia University of Medicine and Surgery, but the Philadelphia Record for March 1, 1880, quotes Dr. E. D. Buckman, Secretary of the Corporators of Penn Medical University, as saying that Dr. Miller's statement about the purchase of the charter of that institution "is not true, the charter has not been sold, nor have the corporators any intention or thought of selling it."

engravings representing healthy and morbid parts, fractures, dislocation and tumors, and the surgical operations necessary for their relief). From time to time it was stated that additions were constantly being made to the museum and to the teaching apparatus. In 1866 the College Announcement specified "extensive chemical and philosophical apparatus . . . the materia medica cabinet embraces all the medicines used by all classes of physicians, hence containing a greater variety than any other in the world . . . the museum consists of a most extensive collection of anatomical, pathological, surgical, obstetrical and zoological specimens, besides many natural curiosities of great interest to the student." Two years later the museum was said to house a most extensive collection "for illustrating pathology, anatomy and surgery, both human and comparative" and that "the elaborate chemical laboratory" was "furnished with every modern improvement." The dissecting room, the College believed, was "the largest and most conveniently arranged in the United States, . . . well supplied with material which has been thoroughly embalmed and disinfected during the summer vacation, so that students dissecting are not liable to contract any malignant disease." All lecture rooms, recitation rooms and other departments occupied by the students "were well ventilated, properly heated and kept in the most cleanly and perfect state by the janitor." (The library of the Pennsylvania Hospital was also available to students who paid a small annual fee "for studying disease at the bedside in that hospital.") In 1874 mention is made of the addition of a "sciopticon (for magnifying microscopic objects to a size convenient for observation), spectroscope, gas microscope and other appliances for teaching and illustrating the exact cause and nature of disease, together with the remedies for their removal." In 1875 the College laid claim to possessing philosophical, chemical and physiological apparatus of every description required for purposes of lecture or private study, and that to these teaching aids additions were constantly being made. A "printing establishment" was also part of the University equipment.

II. CURRICULUM

The curriculum bore a strong resemblance to that of the Eclectic Medical College of Pennsylvania. The first session was of sixteen weeks' duration, with practical anatomy and surgery scheduled for the portion of the session during which the weather was cold. Emphasis was placed upon training in military surgery. The College laid claim (1861) that its curriculum was so complete (six to eight lectures daily) and its faculty so learned that the school had in short time become third in the number of its students out of seven medical schools in the city, and the students numbered among them "many able practitioners of medicine and surgery, doctors of divinity, graduates of the first literary colleges of our country and those who have attended two and three courses of lectures in Allopathic colleges."

Order of Lectures for the Fall and Winter Session of 1864 and 1865.

Professor Dalton—Monday, Tuesday, Thursday, and Friday, 9 to 10 A.M.

Professor Paine—Monday, Tuesday, Thursday, and Friday, 10 to 11 A.M.

Professor Gauntt—Monday, Tuesday, and Thursday, 11 to 12 A.M.

Professor Livezey—Tuesday, Thursday, and Friday, 12 M. to 1 P.M.

Professor Doucet—Monday, Friday, and Saturday, 3 to 4 P.M.

Professor Jones—Monday, Tuesday, Thursday, and Friday, 4 to 5 P.M.

Professor Thomas—Monday, Friday, and Saturday, 5 to 6 P.M.

Professor Mc Clintock—Tuesday and Thursday, 5 to 6 P.M.

Clinic by Professors Paine, Thomas, and Mc Clintock—Wednesday, 3 to 5 P.M.; hospital, 9 to 12 A.M.

Hospital, Saturday, 9 to 12 A.M.

In Announcements of the next year it was pointed out that practical anatomy was taught both in the dissecting room upon the cadaver and by review and quiz by the demonstrator.

It was admitted that enrollment was much reduced by the war, but the number of students was "quite as large as any other College in this city, and that too from nearly every state, not in rebellion, including the Canadas . . . in point of numbers and talent . . . the College is second to no college in the United States . . . we wish our friends to . . . continue their efforts and fill our halls . . . with another class. . . ."

The College was delighted with the news, in mid-1863, that Surgeon-General Hammond had determined to abolish the use of calomel and tartar-emetic in the army. No other method of limiting the use of these agents having proved availing, they were ordered stricken from the supply table, no further requisitions for them to be approved by medical directors. In his orders to hospital and field surgeons, the Surgeon-General remarked: "No doubt can exist that more harm has resulted from the misuse of both of these agents in the treatment of disease, than benefit from their proper administration." The next issue of the Journal (July) in reporting on the Chicago meeting of the "Old School Medical Association" commented that most of the meeting was given over to a discussion of the Surgeon-General's order prohibiting the use of mercury[5] and antimony. The August issue reprinted the clipping reproduced below, taken from one of the Journal's "exchanges." The editor praised the Surgeon-General for having overcome the "prejudices" of his "old school" education and having issued orders against the offending agents, for which just and humane act he had been denounced by the "regular calomel and tartar-emetic doctors."

"EFFECT OF THE USE OF MERCURY"

Surgeon-General Hammond has shown to the President a photograph of a soldier in the hospital, whose nose, left cheek, and upper jaw, had been eaten away by gangrene, produced by dosing with calomel, and other destructive materials, which the Surgeon General has recently ordered from the supply tables."

Announcement was made in the same issue of the Journal that not one graduate had failed to pass the most rigid examination of the surgical board, and that over one half of the entire number of graduates of the school were now surgeons or assistant surgeons in the army. This figure was revised in the next issue, which claimed that during the four year period of its existence it had about three hundred matriculates, and over one hundred graduates, among whom were eight or ten army surgeons, one navy surgeon, and between twenty and thirty assistant army surgeons. (Especial attention was being given to qualifying the students for the army and navy.) The charter enabled the college to confer not an Eclectic degree, but the degree of doctor of medicine, with all the rights and privileges of other American medical schools (Journal, September, 1863). However, in December, 1864, word went out that Surgeon-General Barnes ruled against all but "regular" graduates for service as surgeons in the army. In the meantime the College had arranged for the purchase of the Philadelphia College of Medicine, the Medical Department of Pennsylvania College and the Penn Medical University, including nearly all the teaching apparatus of these schools, and the building of the second named school, thus absorbing the "old school" medical colleges and acquiring a most elegant building and teaching apparatus equal to that of any American University. The College faculty was now (1864) united with that of Penn Medical University,[6] thus forming a most talented teaching group. The University corporators had elected five Eclectic College faculty members as corporators of the University so that students of the united Faculties

[5] Dr. J. Milton Sanders claims to have removed mercury, by electrolysis, from a patient who had taken no calomel for twelve years, and one of Dr. Sanders' students did likewise from a person who had not taken any for forty years. (Philadelphia University Journal of Medicine and Surgery, April, 1865, pp. 145–153.) A study of the chemistry courses at the extinct schools of Philadelphia is now in process, and will include a discussion of Dr. Sanders' electrolytic method.

[6] The Penn Medical University disassociated itself from this union 1874, and became independent again, until its close in 1881.

would upon graduation be awarded the University's degree of doctor of medicine or that of the Eclectic College, as the graduate elected —or if he wished, he could graduate from both schools at the same time (since both component colleges retained their respective charters). The graduate could then follow his own dictates as to whether he wished to practice as an Eclectic or old school physician (the word Eclectic not appearing in the name Penn Medical University). Arguments against this development were futile—for the College taught the same anatomy, physiology, chemistry, botany, medical jurisprudence and toxicology as those of "regular" schools, the only differences being in the courses in materia medica, theory and practice, and surgery. However, in materia medica all the old school remedies were taught thoroughly (and the Eclectic and Homoeopathic Medicines were taught in addition). In surgery the teachings were the same, "only in the treatment of surgical disease, in which, in addition to the old school treatment, the resources of the Homoeopathic and Eclectic are considered." The only present difference between "old school" and Eclectic being the latter's more liberal principles and a more extensive materia medica, there could be no possible objection to allowing the graduate to practice simply as a physician and surgeon. Visitors to the College, who were trained in "old schools" both in America and Europe, made almost daily statements in confirmation of the fact that the College faculty was unsurpassed in talent and scientific attainment. The doors were open to all medical men, to listen to lectures, visit the museum, investigate and compare. Returning then to General Barnes' ruling against all but "regular" graduates, the College reminded its students that, as the Penn Medical University was recognized by the army boards as a regular college, graduates, by electing the Penn Medical degree, could avoid having the term Eclectic associated with them. In view of the fact that there was now no question but that there would be another army draft in the spring, students ought to think over this problem. Former graduates could, by paying the graduation fee of thirty dollars, obtain the degree of the Penn Medical University (ad eundem).

In the meantime the reputation of the college was being well upheld by the splendid work being done by its graduates as high-ranking physicians in both civil and military life, the training under Dr. McClintock being a strong factor in their success, and public authorities on several occasions manifested their respect for the alumni of this school. Press notices were friendly:

"Altogether, this institution is an honour to our city, and serves to show that there is real progress in the science of medicine in this country, and that Philadelphia institutions of this kind, as has ever been acknowledged, offer greater facilities than elsewhere, for a thorough medical education.

In thus briefly noticing this important addition to the Philadelphia schools of medicine, it affords us pleasure to state that there is a growing, liberal, or in other words, an enlarged feeling among medical men, and in the community, acknowledging the real worth of true Eclecticism, which means no more nor less than "to prove all things," and "to hold fast that which is good"—or to use all articles of value in the practice of medicine, without regard to the narrow teachings of the past.

For this desirable state of things, we are indebted to a practical education of the people in the science of physiology, by means of popular, free, and cheap lectures. The time was when it would have been considered derogatory to the position of an eminent professor of medicine to stand up before a popular audience, and instruct the people in the best means for preventing, as well as in curing disease. This time has passed; and the medical faculty, as well as the community, ought to be thankful for it.

Among the pioneers in this branch of instruction was Dr. W. Paine, the founder and present Dean of the Eclectic Medical College in this city. In thus taking the initiatory, Dr. Paine, as many might have supposed, did not

make a mistake. He fully realized, that any confidence he might place in people, would not be unappreciated.

The consequence is, that he has built up a flourishing institution, besides enlarging his own practice, to an extent equal to his utmost desires."—Philadelphia Intelligencer. From the Announcement for 1864–65, pages 27, 28. (In September, 1861, a series of popular, free weekly lectures by members of the faculty was announced for Thursday evenings at 8 P.M. The topics would be of vital importance for all ladies and gentlemen, and all were invited.)

"We would call the attention of medical students to the rare advantages offered for a thorough medical education in this institution, which we are assured, are second to none in the country; and to those who are acquainted with the Faculty, no farther assurance is needed of the ability of the school." Reprinted from the Ledger in the Journal, July, 1865, page 304. Alexander Wilder (pages 595–6) tells us that no "reform" medical college was better staffed or administered, and, that the number of graduates at one time exceeded that of any other school in Philadelphia. Mortality was lower and recovery more perfect among the patients treated by the graduates, and the College was an honor to teachers, students, and the Eclectic school of medicine.

With the assumption of the new name "Philadelphia University of Medicine and Surgery," Dr. Paine hoped that the graduates of his college would no longer be compelled to try to live down the opprobrium medicorum resulting from being an Eclectic, an "irregular," only to find themselves excluded from professional recognition, civil or military. He bewailed the fact that the "regulars" had adopted many improvements introduced by medical reformers, without suitable acknowledgment, thus leaving the reformers looking like outsiders. He continued to believe that whether or not the word Eclectic was to be a part of the name of the College, medicine was Eclectic in character, and that Eclectics "had derived their foundation from the everliving laws of truth."

Frequent reference has been made (in connection with statements by Eclectic professors) to the introduction of many entirely new remedies, ranging in number from seventy according to some writers, up to two hundred or more, according to others. Manufacturing pharmacists made these remedies by extracting the alkaloids, resinoids etc. and then recombining them (minus inert material) to give mixtures having the same percentage of active ingredient as present in the plant. It was claimed that these "concentrated remedies" were more reliable, pleasant to take and convenient, than other preparations of the same drug. Among these remedies were solid and powdered extracts, powdered resinoids, crystallized alkaloids, oleo-resins, tinctures essential, concentrated and saturated, and "proximate principles" (including resin, alkaloid and neutral principle combined). As an example we must understand "aconitin," in the illustration, (Fig. 2) listing the new remedies of the Eclectics, as one of these "proximate principles," and not the alkaloid aconitine (and so on throughout the list). The "aconitin" of this list was described as the "active principle" of Aconitum napellus, cultivated extensively in this country but indigenous to Europe. The medicine was prepared from the leaves and root of the plant and was used in the treatment of fevers, facial neuralgia (in doses of one-sixteenth of a grain in contrast to our aconitine, the dose of which is one four-hundredth of a grain), in delirium tremens, herpes and other cutaneous disturbances, as a substitute for morphine where the latter could not be used, because of its effect upon the bowels—in short many painful conditions could be relieved by its use. There seemed to be no interference with the action of heart, arteries, nerves of motion in general or other organs and tissues, and the drug had great range of application, in doses of from one twenty-fourth to one eighth of a grain, repeated at intervals of half hour or hour. For internal use one grain of aconitin was triturated with sixty grains of sugar, and for external use ten grains of aconitin were incorporated with one ounce of lard, and applied

four or five times a day. Aconitum napellus (wolf's bane or monk's hood), known to Pliny was far from being a new source of a medicinal agent. (Another member of the Ranunculaceae, Aconitum ferox, has also been used as an arrow-poison ("bikh") in Nepal, and a source of aconitine.) Other medicinal plants in the list were in use long before the American Eclectic physicians employed them, and these drugs are "new" only in the sense that the method of preparing medicinals from them was new. On the other hand the Eclectics did experiment with, and discuss in their literature, numerous agents prepared from indigenous

In addition to all the remedies taken from other materia medica, including the various branches of the medical profession, the Eclectics have about one hundred of their own, and, of course, entirely new, containing the active principle of our indigenous plants. We append the following list in confirmation of the assertion:—

REMEDIES.

Aconitin,	Aconitum Napellus,	Helonin,	Helonias Dioica,
Ampelopsin,	Ampelopsin Quinquef.,	Hydrastin,	Hydrastis Canadensis,
Alnuin,	Alnus Serulata,	Hyoscyamin,	Hyoscyamus Niger,
Apocynin,	Apocynum Cannabinum,	Irisin,	Iris Versicolor,
Atropin,	Atropa Belladonna,	Jalapin,	Ipomœa Jalapa,
Asclepin,	Asclepias Tuberosa,	Juglandin,	Juglans Cinerea,
Baptisin,	Baptisia Tinctoria,	Leptandrin,	Leptandria Virginica,
Barosmin,	Barosma Crenata,	Lupulin,	Humulus Lupulus,
Caulophyllin,	Caulophyllum Thalic.,	Lycopin,	Lycopus Virginica,
Cerasein,	Cerasus Virginiana,	Macrotin,	Macrotis Racemosa,
Chelonin,	Chelone Glabra,	Menispermin,	Menispermum Canad.,
Chimaphilin,	Chimaphila Umbellata,	Myricin,	Myrica Cerifera,
Collinsonin,	Collinsonia Canadensis;	Phytolacin,	Phytolacca Decandra,
Colocynthin,	Cucumis Colocynthis,	Podophyllin,	Podophyllum Peltatum,
Cornin,	Cornus Florida,	Populin,	Populus Tremuloides,
Corydalin,	Corydalis Formosa,	Prunin,	Prunus Virginiana,
Cypripedin,	Cypripedium Pubescens,	Rhein,	Rheum Palmatum,
Digitalin,	Digitalis Purpurea,	Rhusin,	Rhus Glabrum,
Dioscorein,	Dioscorea Villosa.	Rumin,	Rumex Crispus,
Euonymin,	Euonymus Americanus,	Sanguinarin,	Sanguinaria Canadensis,
Euphurbin,	Euphorbia Corolata,	Scutellarin,	Scutellaria Lateriflora,
Eupatorin, (Perf.)	Eupatorium Perfoliat,	Senecin,	Senecio Gracilis,
Eupatorin, (Purpu.)	Eupatorium Purpureum,	Smilacin,	Smilax Sarsaparilla,
Fraxerin,	Fraxeria Carolinensis,	Stillingin,	Stillingia Sylvatica,
Gelsemin,	Gelseminum Semperv.,	Strychnia,	Strychnos Nux Vomica,
Geranin,	Geranium Maculatum,	Trillin,	Trillium Pendulum,
Gossypiin,	Gossypium Herbaceum,	Veratrin,	Veratrum Virjde,
Hamamelin,	Hamamelis Virginica,	Viburnia,	Viburnum Oxycoccus,
		Xanthoxylin,	Xanthoxylum Frax.,

Leontodin, Pyracin, Betin, Centurin.

CONCENTRATED TINCTURES.

Con. Tinc. Apocynum Cannabinum,	Con. Tinc. Hydrastis Canadensis,
" Aconitum Napellus,	" Hyoscyamus Niger,
" Atropa Belladonna,	" Rhus Glabrum,
" Barosma Crenata,	" Gossypium Herb.,
" Cannabis Indica,	" Scutellaria Lateriflora,
" Chelone Glabra,	" Senecio Gracilis,
" Collinsonia Canadensis,	" Smilax Sarsaparilla,
" Digitalis Purp.,	" Strychnos Nux Vomica,
" Euonymus Americanus,	" Xanthoxylum Frax.
" Eupatorium Purpu.,	

Concentrated Compound Stillingia Alterative.
" Tincture Gelseminum Semp.
" " Veratrum Viride.
Wine Tincture Lobelia Inflata.

OILS.

Oil of Capsicum,	Oil of Solidago,
" Erigeron,	" Xanthoxylum,
" Populus,	" Lobelia,
" Stillingia,	Oleo-Resin of Lobelia.

FIG. 2. Some of the "entirely new" remedies of the Eclectics. (Reproduced from the Announcement of the College for 1864–5, pp. 7–8.)

American plants. Paine published a book, The Medicinal Properties and Uses of Concentrated Medicines (Philadelphia, 1865, pp. 184 plus V), in which he gave many details about these remedies (pp. 6–115), their doses (pp. 115–121), the materia medica (pp. 122–173), and the pharmacy of certain special preparations (pp. 175–181).

The organization and administration of the curriculum deserve a little attention in this study. In 1860 there were two sessions, a winter course and a spring and summer course. In 1865 it was decided to abandon the spring session and to lengthen the winter session to a period ranging from five to six months, thus rendering the courses more complete. Six years of experimenting with a four month term led to the conviction that there was not adequate time to give full lecture courses, nor was the student able to master the subjects discussed. Lengthening the session would make it possible to give instruction as thorough as in any medical school in the country and to elevate the standard of "liberal" education far above that at present-day Eclectic schools. The College thought it proper to take the lead in improving the educational standards of Eclectic schools and thus to contribute to a movement so vitally important for the future. Let no one imagine that the spring term was being abandoned because the class was small, for the classes had been large and the quality of the students not inferior to any previous classes. The receipts of the College would not increase, but the plan would pay off, in that better qualified practitioners would be sent out to the world. Within a month of this announcement the College announced the more radical change, that of its name to the "Philadelphia University of Medicine and Surgery." One of the reasons given for this act was that "every charlatan who intrudes his quackery upon the patience of the public, dubs himself at once an 'Eclectic physician'. . . . In almost every little by-street a glaring sign will announce to the passer-by that John Smith, 'Eclectic Physician' is prepared to astonish all the world . . . with his wonderful cures by means of his marvellous 'Essence of Vitae' ".[7] The Dean admitted that parting with the word Eclectic brought sorrow to his heart, but the spirit of true Eclecticism was being retained. Under the title of "University" even greater educational advantage would result. A more extended session would be given, the instructors would devote even greater care to the selection of subject matter to be taught and useless subjects avoided.

Despite the resolve in 1865[8] to hold but one

[7] By 1865 so many Eclectic graduates had ceased to announce themselves as such, in order to avert opposition, that the apparent number of Eclectics in the United States was only between one and two thousand (including the quacks), while the real number of true Eclectics and reformers was over eight thousand. "Party" schools in various cities were proving unsuccessful, and even the Eclectic Medical College of Philadelphia "with all its extensive arrangements for teaching would hardly exceed a hundred students each session." Furthermore, when given the choice, only two out of over sixty elected to take the Eclectic degree, the vast majority choosing the regular "doctor of medicine" degree of the Penn Medical University, feeling that they could thus escape the odium fastened upon the holders of the Eclectic degree to the effect that they were "pepper shop, hot-house graduates of some of the little retail Eclectic diploma shops of this city, and other places." Paine pointed out that this tendency was true of Homoeopathic colleges also, and that this made the time ripe for the reformer to assume entire control of the profession—"old" schools had adopted many Eclectic reforms, and now, if "new" school physicians would unite in efforts to break down all "party strifes, names and creeds," medical sectarianism would soon be known only to history, and the united profession would benefit from the improvements introduced by all parties and sects. This would be very beneficial to the entire public, and at the same time enable the people to distinguish between scientific physicians and reformers on the one hand, and the ignorant pretenders and impostors, who now infest the various sects, on the other hand.

[8] It may be of incidental interest to note here that the faculty and students held a special meeting, upon hearing of the assassination of President Lincoln, and expressed their grief, in a series of resolutions, one of which called for the closing of the College until Friday, the 21st, draping the building, and all students wearing "a suitable badge for at least thirty days." There were very moving speeches by Drs. Paine and McClintock.

In 1866 the University required of permanently disabled, honorably discharged soldiers, the payment of half-fees.

session a year, we find that in the years immediately following this announcement the University was once more organized for holding two sessions, the winter session from October to the end of February, and the spring and summer session, beginning in March. An additional advantage of the spring and summer course was that a student could pursue any one or more studies (Latin, Greek, mathematics, botany, zoology, chemistry, anatomy, physiology, etc.) in the Arts Department, if he so wished, and, upon passing the requisite examination, win the degree of Bachelor of Arts.

The curriculum in these sessions embraced the following:

"TWO SESSIONS OF LECTURES ANNUALLY"

The first Session commencing October 1st, and continuing until March, embraces Anatomy, Physiology, Materia Medica, Practice, Obstetrics, Practical and Demonstrative Anatomy, Military and Plastic Surgery, Pathology, Diseases of Women and Children, Diseases of the Eye and Ear, Clinical Medicine and Surgery, Medical Jurisprudence, and Chemistry.

The second session commences on the first Monday in March, and closing the last of June. This Session, constitutes the Spring and Summer Sessions, and embraces the following Studies:—Surgical, Microscopic, Pathological, Descriptive and Demonstrative Anatomy; Plastic, Military, and Operative Surgery; Analytic and Organic Chemistry; Pharmacy; Materia Medica, including Practical Botany; Obstetrics, and Diseases of Women and Children; Comparative and Human Physiology; Auscultation and Percussion; Practical Instructions in the Use of the Microscope, Laryngoscope, Stethoscope, Ophthalmoscope, Auroscope, and Rhinoscope; also practical instructions in the use of the Speculum, Catheter, Bougies, etc., Principles and Practice of Medicine and Pathology; Clinical Medicine and Surgery; General and Special Technology; and Clinical Instructions in the use of Atomizers, Nebulizers, Hypodermic Injections, Inhalation, etc., etc." (1866–67)

(In 1865 the University announced a special course of lectures,—optional—, on urinopathology. The twenty-four lectures were devoted to physical and chemical properties of urine, taught by means of tests and experiments before the class, as well as by explanations of diagrams, charts, exhibition of a full set of "urinary deposits" and microscopical examination. The training given in this course would enable a physician to determine in a few minutes, the nature of any kind of sediment in the urine as an aid in diagnosis. The professor, Lincoln Oldshue, was an authority on the subject.)

In 1868 four sessions per year were announced. The first session ran from the first Monday in October until December 25. The subjects taught were the same as those listed in the first session immediately above, except that medical technology, writing, drawing and book-keeping were included. The second session embraced the same studies as the first session, and ran from the first Monday in January until the first Monday in March. The third session ran from the first Monday in March until the first of July. There were no classes during the months of July and August. The fourth session ran from the first Monday of September until the first Monday of October. The subjects covered were the same as those in the second session reproduced above, with the addition of writing, drawing and book-keeping. (The University thus made available what we would today call "remedial instruction" in order that "those who are deficient in a preparatory education are properly instructed and advanced as soon as qualified.") The purpose of the course in technology was to teach the precise derivation and definition of each term in the various branches of medicine, leaving the student with clear conceptions of otherwise abstruse terms. Orthography, grammar, signs and abbreviations in writing prescriptions were also taught in this course. The object of the course in drawing was to train the

student in the art of sketching, that he might be able to make drawings of morbid anatomy and thus have clear mental pictures of such phenomena. The chairs of drawing and "technology" were unique in medical education.

At this point in the history of the University it felt itself called upon to issue a plea that the Legislature take action calculated to "sweep out" all sham medical schools, some of which had no more building than a few rented rooms on a back street, no more anatomical and pathological preparations than a skeleton or two and no more library than ten to twenty dollars' worth of books. It was suggested that a Medical Examining Board be set up, and that no graduate be allowed to practice medicine, surgery and midwifery unless he had passed a strict test of the Board, the test being the same for graduates of all the different schools, except in materia medica, in which there could be separate examinations for each "school or party." The appeal was directed to all rival schools and it was hoped that they would all be ready to "smoke the pipe of peace," and pull together for the purpose of placing Philadelphia at the forefront of the movement to rid the nation of the uneducated quacks who "now impregnate the whole atmosphere with their nostrums."

In 1869 the University issued an invitation to all regularly ordained clergymen in good standing to attend the lectures of the medical course, to which they would be admitted upon payment of the matriculation fee only. Students of theology and of law could have the same privilege upon payment of thirty dollars and the matriculation fee, if they did not intend to make the practice of medicine their profession. A regular graduate in medicine who had been practicing for not less than four years could win "ad eundem" degree from the University.

Training in clinics was available at Pennsylvania Hospital, Will's, Philadelphia Hospital and others, and various dispensaries in the city, and there were facilities for obtaining a practical knowledge of midwifery. There were a surgical and a medical clinic in the University building each week, at which students could obtain a thorough knowledge of disease, under the professors of surgery and of medicine, and members of the graduating class could learn the art of compounding prescriptions under the professor of materia medica and pharmacy. The application of the knowledge gained in class-room lectures to the problems of the clinic was regarded as a highly important element in the educational process.

In 1865 a hospital was chartered, with a capital stock of sixty thousand dollars. (In the meantime the University building was fitted up with from twenty to thirty beds for patients who had undergone major surgery in the clinic.) The Constitution and By-Laws of the hospital appear in the University Journal for February, 1870.

The University set great store by the ability of its professors as teachers and scholars. For Paine it claimed a greater knowledge of the new remedies than any living physician, marked originality in doctrines of pathology and in theory of typhoid fever (which he claimed to be but a modification of measles!). Dr. Jones's course in materia medica and pharmacy reviewed every article used in all of the sects of medicine and the professor demonstrated various methods of manufacturing, compounding and dispensing drugs. The Journal for June, 1860, reprints testimonal letters in honor of Dr. Gauntt's abilities, one letter being written by Franklin Bache. Other numbers over the years discussed the educational methods in use at the University. For example (1866), the winter term, it was stated, consisted mostly of lectures, illustrations and demonstrations, while the spring term was devoted, in addition, to recitations and reviews. There were weekly quizzes on each branch, and, upon graduation, honors and honorable mentions for those who distinguished themselves in their examinations. The University aimed to combine the teaching plan used by Professor John Stewart, L.R.C.S., Edinburgh, (who quizzed upon every bone,

muscle, nerve and artery) with ordinary methods of instruction. In the clinics the senior students were allowed to diagnose and prescribe, after which the lecturers pointed out in what particulars the students were right or wrong. Nearly every subject came in for review in the clinic. In practical surgery the student was required to perform all the operations, minor surgery, bandaging, setting fractures, reducing dislocations and tying arteries, and he was also instructed in the actual performance of the more serious operations both upon the cadaver and upon living patients. Anatomy was taught both by demonstration upon the subject and by the use of models, manikins and preparations. Practical medicine and pathology, auscultation and percussion, obstetrics and diseases of women and children were all taught by means of actual cases and by the use of specimens. Chemistry was taught both by demonstration and by individual laboratory work by the student. For Canadian students there were special courses to prepare both for the matriculating examination and the final examination (1870). In the same year courses leading to degrees in surgery (C.M.), and in the arts (A.B., A.M. and LL.D.) were announced.

The University's College of Surgeons had a faculty consisting of a professor of each of the following: Surgical Pathology; Principles and Practice of Surgery; Surgical Anatomy; Special Operative Surgery (eye, ear, diseases of women and children etc.); Prosector of Surgery and Demonstrator of Surgical Anatomy. There were two sessions of lectures each year, the first from early September until the first of December, the second beginning on the first of April (presumably also of three months' duration). To be admitted to this department a candidate had to be a graduate of an approved medical college. The C.M. degree (master of surgery) was reserved as a symbol of training in a higher branch of medical education. The faculty of this department was not only expected to teach surgery, but also to serve as a Board of Examiners to which a person who had already complied with all the requirements of the College and had had much experience in surgery could apply for examination, and if found qualified, could win the degree without attending a full course of lectures. The examination for the degree was given by the Professors of the Principles and Practice of Surgery, Surgical Anatomy, and Special Surgery, before whom the candidate had to demonstrate surgical anatomy and perform the essential operations upon the cadaver.

The Department of Arts was a medical preparatory school, now organized into two sessions—September 1 to December 1, and January 1 to June 1. The studies listed below were required by the Ontario College of Physicians and Surgeons and was adopted as the curriculum at the Philadelphia University: first (compulsory): English—language, grammar, composition; arithmetic—common and decimal fractions; algebra—simple equations; geometry—first two books of Euclid; Latin—translation and grammar. Second: one elective subject from among Greek, French, German or Physics.

A student could attend medical lectures in his free time and thus be receiving training in both departments at the same time, or he could concentrate in the arts entirely if he did not plan to take a degree in medicine but wished to qualify for some other profession. Candidates who had pursued a curriculum of study prescribed at other universities and colleges could present themselves for examination for the A.B., A.M. and L.L.D.

In 1875 the Second Annual Announcement of the Philadelphia University College of Pharmacy appeared.

Requirements for the medical degree were similar to those at other medical colleges—the candidate must be at least twenty-one years of age, of good moral character and have had a fair "English" education, have pursued the study of medicine for the previous three years, have attended two full courses of lectures at a reputable school at least one of which was at this college and must present a thesis upon some medical subject, in his own handwriting. In 1861 a candidate could offer either three full

courses of lectures and intermediate reading, or four years of practice and one full course of lectures in lieu of the requirement of two full courses of lectures and three years of study. Later statements of requirements for the degree of M.D. omitted to mention such things as thesis, etc., but stipulated the requirement of attendance at a course of hospital lectures of not less than five months. In 1865 the requirements were liberalized, allowing a candidate to present himself for examination after only one session of lectures and three years of practice, and either show mastery, or have his graduation deferred until he could do so, nothing being said about other usual requirements. In 1866 the requirements became three sessions of lectures and three years of study (or four sessions, two of which were at this University), five months of dissecting, passing the examination of each of the regular professors, preparation of "an accredited anatomical or pathological specimen" (and depositing it in the Museum, with his name, age and postal-address attached), and the preparation of a thesis upon some medical subject. In 1868 the number of sessions required was restored to the usual number of two, instead of three. In 1875 a candidate could ask for examination after one session of lectures and three years of study. If found to be qualified he could win his degree. At that time all the other requirements, i.e. full courses on all subjects, one course in practical anatomy, attendance for one season at a hospital and preparation of a thesis were also stipulated.

In 1869 the University Journal published figures on graduates in medicine from twenty-two colleges. Reproduced below are the numbers for the five schools heading the list:

Philadelphia University of Medicine and Surgery	139
Jefferson Medical College	126
University of Pennsylvania	130
Rush Medical College, Chicago	108
Bellevue Hospital Medical College	124

(Earlier, the Journal for April, 1866 claimed that the University had been recognized by the College of Physicians and Surgeons of London, which thus placed the diploma upon an equal footing with European universities, a fact not true of most other American medical colleges.)

The forty-eight page University Journal, besides giving an occasional page to advertising itself, gave much publicity to Dr. Longshore's Philadelphia System of Obstetrics, in Twelve Parts Fully Illustrated, (800 pages), described by Alexander Wilder as a work "of great merit." Another heavily advertised author was Dr. Paine himself, whose Epitome of the American Eclectic Practice of Medicine was 1200 pages in length and dealt with nearly every phase of medical practice.

Before bringing the discussion of this medical school to a close it may be worth while to tell briefly one episode in the long struggle against the charge of selling diplomas: the University emphasized that it had a faculty of eminent physicians, whose high moral principles and distinguished teaching abilities were well known. Two professors, Duffee and Maxon, were graduates of Jefferson, and three, Buckman, Longshore and Gauntt, were graduates of the University of Pennsylvania, so no charges of heresy could be levelled against the school, but there were constant bombardments on the diploma issue. Finally M. F. Timms, of Charleston, S. C., wrote, on April 10, 1868, to Surgeon-General Barnes, inquiring whether graduates of the Philadelphia University of Medicine were eligible for positions as assistant surgeons in the United States Army. The reply, dated April 14, 1868, was in the negative. "Rival colleges" in the city exploited this reply. The solicitor of the University, at the behest of the Trustees, then wrote to the Secretary of War, William W. Belknap, inquiring whether the Surgeon-General was authorized by law to prevent the graduates of the Philadelphia University from obtaining positions as assistant surgeons, especially in view of the fact that many alumni had so served during the Civil War, in both Army and Navy, and some were at the very moment doing so. On October 21, 1869, Dr. Duffee, Professor of Surgery who had served, with distinction, as Brigade Surgeon throughout the war, also

wrote to the Surgeon-General. On November 1, 1869, the Assistant Surgeon-General, C. F. Crane, replied that in view of the fact that the University was not recognized by any medical society and its delegates could not be received at the American Medical Society, its graduates were not eligible for positions in the Army. Joel F. Asper, a member of Congress, then wrote Mr. Belknap, who replied that "such appointments are until further orders, prohibited by law." Again Congressman Asper wrote and on January 24, 1870, William Belknap replied that existing regulations required that candidates must be graduates of regular medical colleges, but in view of the facts: 1) that the Surgeon-General had a letter from the permanent secretary of the American Medical Association, the highest medical authority in the country, that the University was not recognized by any societies, 2) nor its delegates received by the A.M.A. and 3) that the Chicago Medical Journal claims that the University diploma is sold for $150 to persons who were never graduated from it, the editor being in possession of a letter from the Dean of the University which proved the charge, therefore the real and pretended graduates of the University were excluded from competition for appointments to the Army Medical Staff.

The lie about the sale of diplomas having already been exposed and those who published it in this city having been obliged to retract, the Chicago editor was challenged to produce his proof, but could not do so.

The Secretary of War was then asked by Mr. Asper to face the issue squarely and state the law precisely. On January 28, 1870, Mr. Belknap sent a copy of the regulations to Congressman Asper, who found that they said nothing about prohibiting appointments of graduates of schools not recognized by the A.M.A. The fault lay not with the law, but with Barnes's interpretation. Mr. Asper then wrote Mr. Belknap on January 31, 1870, pointing out that the Surgeon-General's decision was not supported by the law, and appealed to the Secretary for a more liberal and fair interpretation of the regulations, so that graduates of all duly chartered colleges which gave a proper medical course, of whatever school of medicine, might compete for positions as assistant surgeon, and if found qualified, be appointed. Further, the Dean explicitly denied ever having written a letter offering diplomas at $150. (The law actually read in such a way that only the proof of knowledge by examination, and not graduation from any college, recognized or not recognized, was required.) On February 10th, 1870, the Inspector-General, Edward Shriver, wrote that Mr. Belknap had instructed him to write the Congressman that hereafter the graduates of any medical college having a thorough and complete course of medical studies could be candidates for appointment to the Medical Department of the Army.

Thus one after another of the slanders by enemies of the University were met and refuted.

III. (A) FACULTY

Session of 1860

James McClintock, M.D., Professor of the Institutes and Practice of Surgery.

William Paine, M.D., Professor of the Principles and Practice of Medicine and Pathology, and Dean.

Thomas Jones, M.D., Professor of Materia Medica, Therapeutics, Medical Botany, and Pharmacy.

James McClintock, M.D., Professor of Anatomy and Physiology.

Charles Gauntt, M.D., Professor of Chemistry, Toxicology, and Medical Jurisprudence.

C. H. Cleveland, M.D., Professor of Obstetrics, and Diseases of Women and Children.

E. E. Andrews, M.D., Demonstrator of Anatomy.

Session of 1861

E. G. Dalton, M.D., Professor of Physiology.

James McClintock, M.D., Professor of the Institutes and Practice of Surgery.

William Paine, M.D., Professor of the Principles and Practice of Medicine and Pathology, and Dean.

C. Stockton Gauntt, M.D., Professor of Materia Medica, Therapeutics, Medical Botany, and Pharmacy.

James McClintock, M.D., Professor of Anatomy, General and Microscopic.

C. Stockton Gauntt, M.D., Professor of Chemistry, Toxicology, and Medical Jurisprudence.

William Paine, M.D., Professor of the Medical Properties and Use of Concentrated Eclectic Medicines.

Benjamin F. Paine, M.D., Professor of Obstetrics, and Diseases of Women and Children.

W. B. Jones, M.D., Demonstrator of Anatomy and Surgery.

Session of 1862

Dr. McClintock became Professor of Operative Surgery, Dr. A. Livezey Professor of Institutes and Practice of Surgery, Dr. W. B. Jones Professor of Anatomy, Dr. Price Demonstrator of Anatomy, and Dr. Lincoln Oldshue Professor of Pathology.

Session of 1863-64

James McClintock, M.D., Professor of Military and Operative Surgery, and Emeritus Professor of Anatomy and Surgery.

William Paine, M.D., Professor of the Principles and Practice of Medicine and Pathology, and Dean.

Charles Stockton Gauntt, M.D., Professor of Chemistry, Pharmacy, and Toxicology.

Benjamin F. Paine, M.D., Professor of Obstetrics and Diseases of Women and Children.

Abraham Livezey, M.D., Professor of the Institutes and Practice of Surgery.

William B. Jones, M.D., Professor of Anatomy, General and Microscopic.

E. G. Dalton, M.D., Professor of Physiology, Botany, and Materia Medica.

L. Oldshue, M.D., Professor of Pathology.

T. F. Blake, M.D., Demonstrator of Anatomy.

Robert Tusting, M.D., Demonstrator of Practical Surgery.

Session of Spring 1864

The following changes were made in the Faculty of 1863-64 above: A. R. Thomas, M.D., became Professor of Obstetrics and Diseases of Women and Children, replacing Benjamin F. Paine, M.D., and Homer J. Doucet, M.D., became Professor of Materia Medica, Therapeutics and Botany, leaving Dr. Dalton with responsibility for Physiology only.

Session of 1864-65

J. Milton Sanders, M.D., LL.D., Emeritus Professor of Chemistry.

James Mc Clintock, M.D., Professor of Military, Operative and General Surgery.

William Paine, M.D., Professor of the Principles and Practice of Medicine and Pathology, and Dean.

Charles Stockton Gauntt, M.D., Professor of Chemistry, Pharmacy and Toxicology.

Abraham Livezey, M.D., Professor of Obstetrics and Diseases of Women and Children.

A. R. Thomas, M.D., Professor of Practical and Surgical Anatomy and Minor Surgery.

William B. Jones, M.D., Professor of Anatomy, General and Microscopic.

E. G. Dalton, M.D., Professor of Physiology and Medical Jurisprudence.

H. J. Doucet, M.D., Professor of Materia Medica and Therapeutics.

L. Oldshue, M.D., Professor of Pathology.

T. F. Blake, M.D., Demonstrator of Anatomy.

Session of Spring 1865

"The (Penn Medical) University and Eclectic College have united so far as the teaching and Faculty are concerned, although each maintains an independent board of corporators, and the students can graduate either from the University or Eclectic College, by attending the lectures of the united Faculty."

United Faculty of Medicine

J. Milton Sanders, LL.D., M.D., Emeritus Professor of Chemistry.

James McClintock, M.D., Professor of Surgery, General, Military and Operative.

L. W. Buffington, M.D., Adjunct Professor.

William Paine, M.D., Professor of the Principles and Practice of Medicine and Pathology, and Dean.
Charles Stockton Gauntt, M.D., Professor of Chemistry, Pharmacy and Toxicology.
Elbridge Gerry Dalton, M.D., Professor of Physiology.
Charles A. Leech, M.D., Adjunct Professor.
Abraham Livezey, M.D., Professor of Obstetrics and Diseases of Women and Children.
Joseph S. Longshore, M.D., Adjunct Professor.
A. R. Thomas, M.D., Professor of Anatomy, General, Microscopic and Surgical.
H. J. Doucet, M.D., Professor of Materia Medica and Therapeutics.
E. D. Buckman, M.D., Adjunct Professor.
Lincoln Oldshue, M.D., Professor of Urino-Pathology (Optional).
Isaac Lukens, M.D., D.D.S., Professor of Dental Surgery (Optional).
Charles Murphy, Esq., M.D., Professor of Medical Jurisprudence and Mental Philosophy.
K. B. Sayres, M.D., Demonstrator of Anatomy.

Session of 1865–66

The following changes were made, for this session, in the faculty for Spring 1865: Drs. Buffington, Leech and Buckman left, Dr. Livezey became Adjunct Professor of Obstetrics, Dr. Longshore added Obstetrics to the other duties of his chair, Dr. Sayers became Professor of Minor Surgery and Dr. Rufus B. Weaver, Demonstrator of Anatomy.

Session of 1866–67

James McClintock, A.M., M.D., Professor of the Principles and Practice of Surgery.
William Paine, M.D., Professor of the Principles and Practice of Medicine and Pathology.
C. S. Gauntt, A.M., M.D., Professor of Chemistry, Pharmacy, and Toxicology.
E. G. Dalton, A.M., M.D., Professor of Physiology.
H. J. Doucet, A.M., M.D., Professor of Materia Medica and Therapeutics.
A. R. Thomas, M.D., Professor of Anatomy, General, Special, Microscopical, and Pathological.
Joseph S. Longshore, M.D., Professor of Obstetrics, and Diseases of Women and Children.
E. D. Buckman, M.D., Professor of Minor Surgery.

Professors of Special Branches

A. Livezey, A.M., M.D., Professor of Clinical Medicine.
J. S. Longshore, M.D., Professor of Clinical Obstetrics.
C. J. Lane, M.D., Professor of Diseases of the Eye and Ear.
R. H. Kline, M.D., Professor of Malignant Diseases.
L. Oldshue, M.D., Professor of Urino-Pathology.
I. Lukens, M.D., D.D.S., Professor of Dentistry.
C. Murphy, M.D., Professor of Medical Jurisprudence.
W. M. Cornell, M.D., LL.D., Professor of Hygiene and Physical Culture.
R. B. Weaver, A.M., M.D., Demonstrator of Anatomy.

Session of Spring and Summer 1867

William Paine, M.D., Professor of Theory and Practice of Medicine.
Washington J. Duffee, M.D., Professor of Surgery.
Joseph S. Longshore, M.D., Professor of Obstetrics.
E. R. Maxon, M.D., Professor of Anatomy.
C. S. Gauntt, M.D., Professor of Chemistry.
H. J. Doucet, M.D., Professor of Materia Medica.
John H. O'Byrne, Esq., Professor of Medical Jurisprudence.
Thomas B. Miller, M.D., Professor of Botany

Adjunct Faculty

William Paine, M.D., Clinical Lecturer on Medicine.
Rufus B. Weaver, M.D., Professor of Anatomy and Demonstrator of Anatomy.
E. Cornell Esten, M.D., Professor of Physiology.
N. R. Lynch, M.D., Professor of Obstetrics.
W. C. Buckley, M.D., Professor of Materia Medica.

Chester N. Farr, Professor of Drawing and Penmanship.

Washington J. Duffee, M.D., Clinical Lecturer in Surgery.

Rev. William Major, M.D., Chaplain of the University.

(The duties of the members of the Adjunct Faculty were to relieve, to a certain measure, the regular professors, when these became overtaxed; to lecture during their absence or illness; and to assist in teaching or examining students on minor points. The Adjunct Faculty also delivered lectures during the summer sessions. It was the intention of the College to encourage promising young physicians to become teachers, by thus rewarding their talents and efforts by this recognition.)

Fall and Winter Sessions of 1867–68

Charles W. Gleason, M.D., Professor Emeritus of Surgery.

William Paine, M.D., Professor of Principles and Practice of Medicine and Pathology and Clinical Lecturer on Medicine.

C. Stockton Gauntt, A.M., M.D., Professor of Chemistry, Pharmacy and Toxicology.

E. G. Dalton, M.D., Professor of Physiology and Medical Jurisprudence.

H. J. Doucet, A.M., M.D., Professor of Materia Medica and Medical Botany.

A. R. Thomas, M.D., Professor of Anatomy.

Joseph S. Longshore, M.D., Professor of Obstetrics and Diseases of Women and Children.

M. C. Woodworth, M.D., Professor of Surgery. (C. M. Wight, M.D. was appointed to the chair of surgery after Dr. Woodworth's appointment was announced.)

E. D. Buckman, M.D., Professor of Minor Surgery.

F. A. von Moschzisker, M.D., Clinical Lecturer on Ophthalmic and Aural Surgery.

Rufus B. Weaver, M.D., Demonstrator of Anatomy.

Spring and Summer, 1868

C. S. Gauntt, M.D., (Chemistry and Pharmacy), E. G. Dalton, M.D., (Medical Technology, Composition and Grammar), J. M. Hole, M.D., (Principles of Medicine and Pathology), C. M. Wight, M.D., (Surgery), W. B. Jones, M.D., (Anatomy, Surgical and Microscopic), E. C. Esten, M.D., (Pathology), W. C. Buckley, M.D., (Materia Medica and Medical Botany,) N. R. Lynch, M.D., (Obstetrics and Diseases of Women and Children), Chester M. Farr, Esq., (Penmanship, Bookeeping and Drawing). (Dr. Hole's name was withdrawn after it was announced, and that of Dr. Paine replaced it.)

Session of 1868–69

W. Paine, M.D., Dean of the Faculty, and Professor of the Principles and Practice of Medicine and Pathology.

C. S. Gauntt, A.M., M.D., Professor of Chemistry, Pharmacy, and Toxicology.

H. J. Doucet, M.D., Professor of Materia Medica and Therapeutics.

J. S. Longshore, A.M., M.D., Professor of Obstetrics, and Diseases of Women and Children.

A. R. Thomas, M.D., Professor of Anatomy.

E. D. Buckman, M.D., Professor of Physiology.

J. Lizars Lizars, M.D., M.R.C.S., Eng. and Edinburgh, Professor of Surgery, Descriptive, Military, and Operative.

Robert Ramsay, M.D., L.M. Edinburgh, Professor of Technology.

John O'Byrne, Esq., Professor of Medical Jurisprudence.

T. B. Miller, M.D., Professor of Botany.

Chester N. Farr, Esq., Professor of Drawing, Penmanship, and Phonography.

Rufus B. Weaver, M.D., Demonstrator of Anatomy.

Professors W. Paine, M.D., and Robert Ramsay, M.D., Clinical Lecturers on Medicine.

J. L. Lizars, M.D., M.R.C.S., Edinburgh, Clinical Lecturer on Surgery and Diseases of the Eye and Ear.

Adjunct Faculty

Robert Ramsay, M.D., L.M. Edinburgh, Adj. Professor of the Theory and Practice of Medicine.

N. R. Lynch, M.D., Adj. Professor of Obstetrics, and Diseases of Women and Children.
E. Cornell Esten, M.D., Adj. Professor of Physiology.
Rufus B. Weaver, A.M., M.D., Adj. Professor of Anatomy.
W. C. Buckley, M.D., Adj. Professor of Materia Medica.

Session of 1869–70

William Paine, A.M., M.D., Professor of the Principles and Practice of Medicine and Pathology, and Dean.
Washington Joseph Duffee, A.M., M.D., Professor of Surgery.
E. D. Buckman, A.M., M.D., Professor of Physiology.
Joseph S. Longshore, A.M., M.D., Professor of Obstetrics.
C. Stockton Gauntt, A.M., M.D., Professor of Chemistry, Pharmacy, and Toxicology.
H. J. Doucet, A.M., M.D., Professor of Materia Medica and Therapeutics.
E. R. Maxon, M.D., Professor of Anatomy.
Rufus B. Weaver, A.M., M.D., Demonstrator of Anatomy.
Edgar T. Simms, M.D., Assistant Demonstrator of Anatomy and Prosector of Surgery.
John O'Byrne, Esq., Lecturer on Medical Jurisprudence.
Rev. Dr. William Major, Chaplain.
Professors Paine and Duffee, Clinical Lecturers on Medicine and Surgery.

Session of Summer 1870

The faculty was the same as in the 1869–70 session, except that Drs. Weaver and Simms were not members of the group. Dr. A. D. Loomis was Demonstrator of Anatomy.

Session of 1870–71

The Faculty was the same as that of 1869–70, with the following exceptions: Drs. Weaver and John O'Byrne left. Dr. Paine became Demonstrator of Anatomy. (A. D. Loomis, M.D., was also so listed.)

Sessions of 1875–76

William Paine, M.D., Professor of the Theory and Practice of Medicine and Pathology, and Demonstrator of Anatomy.
C. S. Gauntt, M.D., Professor of Chemistry and Toxicology.
H. J. Doucet(t), M.D., Professor of Materia Medica and Therapeutics.
J. T. Walton, M.D., Professor of the Institutes of Medicine, and Dean.
J. R. Lansdowne, M.D., Professor of the Principles and Practice of Surgery.
S. Rosenstein, M.D., Professor of Anatomy and Histology.
Thomas B. Miller, M.D., Professor of Obstetrics and Diseases of Women and Children.

III. (B) ALPHABETIZED LIST OF MEMBERS OF THE FACULTY

(For Faculty grouped by year, see previous pages)

Andrews, E. E., M.D., 1860
Blake, T. F., M.D., 1863–65
Buckley, W. C., M.D., 1867–68
Buckman,[9] E. D., M.D., 1865–70
Buffington, L. W., M.D., 1865
Cleveland, C. H., M.D., 1860
Cornell, W. M., M.D., 1866
Dalton, E. G., M.D., 1861–68
Doucet, Homer J., M.D., 1864–76
Duffee,[10] Washington J., M.D., 1867, 69–71
Esten, E. C., M.D., 1867–68
Farr, Chester, M. Esq., 1867–69
Gauntt,[11] Charles Stockton, M.D., 1860–76

[9] Edwin D. Buckman was a graduate of the University of Pennsylvania and became a prominent physiologist and author.

[10] Washington J. Duffee was formerly demonstrator of Anatomy at Jefferson, for many years Surgeon-in-Chief of the Philadelphia Hospital, and Brigade Surgeon for four years during the Civil War.

[11] C. Stockton Gauntt, after graduating from the School of Medicine of the University of Pennsylvania, travelled in Europe, attending clinics of Guy's and St. Thomas's Hospitals in London, and the chemistry lectures of Michael Faraday at the Royal Institution. Returning to Philadelphia he studied with, and assisted, James B. Rogers, Professor of Chemistry at the University of Pennsylvania, in Dr. Rogers' lectures at Franklin

Gleason,[12] Charles W., M.D., 1867
(Hole, J. M., M.D., 1868)
Jones, Thomas, M.D., 1860
Jones, William B., M.D., 1861–65, 1868
Kline, R. H., M.D., 1866
Lane, C. J., M.D., 1866
Landsdowne,[13] J. R., M.D., 1875
Leech, Charles A., M.D., 1865
Livezey, Abraham, M.D., 1862–67
Lizars,[14] J. Lizars, M.D., M.R.C.S., 1868
Longshore,* Joseph S., M.D., 1865–70
Loomis, A. D., M.D., 1870
Lukens, Isaac, M.D., D.D.S., 1865–67
Lynch, N. R., M.D., 1867–69
Major, William, Rev. Dr. 1867–70
Maxon,[15] E. R., M.D., 1867–69, 1871
McClintock,[16] James, M.D., 1860–67
Miller, Thomas, M.D., 1867–76
Murphy, Charles, Esq., 1865–67
O'Byrne, John, Esq., 1867–70
Oldshue,[17] Lincoln, M.D., 1862–67
Paine, Benjamin F., M.D., 1861–63
Paine,[18] William, M.D., 1860–76

Medical College and Franklin Institute. He held teaching posts, practiced medicine for a time, and was appointed Army Surgeon at the General Hospital at Gettysburg after the battle there, a post at which he remained for a brief period.

[12] Charles W. Gleason possessed "the largest private anatomical surgical, pathological and physiological museum in the United States, all of which he has tendered to the use of the University."

[13] Joseph Ruscombe Lansdowne graduated both from the University of Edinburgh and the College of Physicians and Surgeons of Glasgow, was a member of the Royal College of Surgeons of Great Britain, Surgeon to the British Emigration Commissioners, and surgeon to several hospitals in Brisbane, Australia.

[14] J. Lizars Lizars M.D., M.R.C.S., Eng. and Edin., was a private pupil of his uncle John Lizars of the Royal College of Surgeons, Edinburgh. After passing his examination at the Royal Colleges of Surgeons at both Edinburgh and London, he became Demonstrator of Anatomy, successively, in both colleges. He was on both the French and English Medical Staffs during the Crimean War. Later he occupied the chair of Surgical Anatomy at the Toronto School of Medicine.

* For biographical notes on Drs. Longshore and Thomas, see "The Penn Medical University" (number four of this series).

[15] E. R. Maxon, a Jefferson graduate, had taught in several institutions before joining the Faculty of the Philadelphia University of Medicine and Surgery. While studying in various colleges and hospitals in Europe he prepared his *Science and Practice of Medicine*, which is said to have "received the highest commendation from Professors Gross, Flint, Dixon, and others."

[16] James McClintock held various teaching posts at Jefferson, Castleton (Vermont), Berkshire Medical College (Massachusetts), Washington College (Baltimore), Dickinson College, (Carlisle), etc. He founded the Philadelphia School of Anatomy and Surgery (1838) and the Philadelphia College of Medicine (1847). He held numerous high public offices, and was an outstanding surgeon and anatomist.

[17] Lincoln Oldshue was an Eclectic from the earliest days of that system. He wrote on various medical subjects, and was the author of Urino-Pathology.

[18] It is claimed for Dr. William Paine that it was "mainly due to his writings, teachings and labors that so many of the learned of the Old School have embraced the doctrines and practice" of the Eclectic system. His books include: New School Remedies and Domestic Practice, Theory and Practice of Medicine and Pathology, and books on surgery, on obstetrics and on homoeopathy. He was editor of the Medical Independent and of the Philadelphia University Journal, earlier known as the Eclectic Medical Journal of Philadelphia. He was a member of the Royal College of Physicians and Surgeons. He offered for sale a large number of remedies: Catarrh Vapor was a sure protection against small-pox, diphtheria, cholera, dysentery, yellow fever etc. It was "the most positive cure for consumption and nervous diseases such as epilepsy and palsy ever discovered." When used with his Blood, Stomach, and Liver Tonic, "most magical and astounding results" followed. His other medicines were Liver Renovator, Anti-Periodic Pills (for "malarial diseases", rheumatism, soreness and fugitive pains), Leucorrhea Pills (which made sick women healthy and old women young), about a dozen different syrups, Mecca Oil (for gravel, cancer, etc.), Elixir of Hamamelis for all female diseases, Elixir of Populis for all male diseases, etc. Dr. Paine ran the following item in a pamphlet bearing the title Philadelphia University of Medicine and Surgery:

"Practice by Letter.—Patients residing at a distance and not wishing to visit the institution can receive advice and treatment in the following way:—Write, giving age, color of hair and eyes, height, weight, length of time sick, and as near as possible, the cause of the disease; the condition of the bowels and appetite, whether married or single, if there is sexual difficulty what it is, and how many children. State whether the Heart is regular in action or not, the breathing difficult, and if there is a cough, how long it has existed, the habits in eating, drinking, smoking, chewing, etc., the

Price, , M.D., 1862
Ramsay,[19] Robert, M.D., L.M., 1868
Rosenstein, S., M.D., 1875
Sanders, J. Milton, M.D., 1864–65
Sayres, K. B., M.D., 1865–66
Simms, Edgar T., 1869–70
Thomas,* A. R., M.D., 1864–69
Trusting, Robert, M.D., 1863
von Moschzisker, F. A., M.D., 1867
Walton,[20] J. T., M.D., 1875
Weaver, Rufus B., M.D., 1865–70
Wight, C. M., M.D., 1867
Woodworth,[21] M. C., M.D., 1867

IV. TEXTBOOKS AND WORKS OF REFERENCE USED

From 1860 until 1865 any standard works in use by Eclectics, Homoeopaths, Allopaths or Botanics could be used by students who already owned them, and all "modern" publications of all schools of medicine were recommended, but the student who did not previously own such books was advised to furnish himself with the following: Epitome of the Eclectic Practice of Medicine, Surgery, Materia Medica, Obstetrics, etc., by Professor Paine, M.D.; American Eclectic Practice of Medicine, Materia Medica, and Surgery, by Professor Wooster Beach, M.D., (three volumes); American Eclectic Dispensatory, by John King, M.D.; Obstetrics, by John King, M.D.; Homoeopathic Materia Medica, by C. J. Hemple, M.D.; Clinical Lectures, by J. H. Bennett, M.D.; Hoblyn's Medical Dictionary; Dalton's Physiology; Botanic Materia Medica, by John Kost, M.D.; Graham's, "or some of the standard works on Chemistry." In 1865 Oldshue's Pathology was introduced.

From 1866 until 1871:

Practice of Medicine: Paine's Practice of Medicine; Pereira's Therapeutics; Walshe on the Diseases of the Heart and Lungs, including Physical Diagnosis; Aitkin's Practice and Science of Medicine; Maxon's Science and Practice of Medicine.

Anatomy: Morton's Elementary Treatise on Human Anatomy; Wilson's Anatomy, with Kolliker's Microscopical Anatomy, or Sharpey and Quain's Anatomy; Gray's Anatomy.

Materia Medica: Paine's Synopsis, Therapeupeutics, and Dispensatory; Abridgment of Pereira's Materia Medica.

Chemistry: Fownes' Chemistry; Johnston's Chemistry; Turner's Chemistry; Regnault's Chemistry; Lehman's Physiological Chemistry; Taylor's Toxicology.

Surgery: Lizar's Practice of Surgery; Paget's Surgical Pathology; MacLeod's Surgical Diagnosis; Sym's Principles and Practice.

Institutes of Medicine: Kirke's Manual; Virchow's Cellular Pathology; Paine's Institutes of Medicine.

Obstetrics: Longshore's Obstetrics; West on Diseases of Women; West on Diseases of Children.

1875:

Anatomy. Gray, Wilson.

Practice of Medicine. Paine, Aitkins, Maxson, Bennett, Tanner, Newton.

Surgery. Erichsen, Druitt.

Obstetrics and Diseases of Women and Children. Longshore's Philadelphia Obstetrics. Cazeaux, West, Barnes, Taylor, Tilt.

Materia Medica. Paine, Pereira, U. S. Dispensatory, American Dispensatory.

occupation, habits and diseases of Parents if living, if dead what was the cause of their death. If there is any unnatural discharge from the *Head, Throat, Lungs, Stomach, Bowels, Bladder,* or *Sexual Organs,* the smallest possible quantity should be put between two very small pieces of paper and enclosed in the letter containing the description of the disease, as, by means of the microscope, we can determine the nature of the disease infinitely better than by seeing the patient."

[19] Robert Ramsay was an "honors" graduate in medicine, Queen's College, Canada and a Licentiate of Edinburgh, Scotland. He was a writer on "various branches of medical science."

[20] John Tompkins Walton graduated from the University of Pennsylvania in 1855 and served throughout the Civil War as a surgeon. He was an assistant of Samuel Jackson, at the University of Pennsylvania, for many years, and conducted experiments for Dr. Jackson on digestion.

[21] Milton C. Woodworth was Medical Director and Surgeon-in-Chief in the Western Army and Professor of Operative Surgery at Western Reserve Medical College in Cleveland, Ohio.

Institutes of Medicine. Marshall, Carpenter, Draper, Kirke's Manual.
Chemistry. Fownes, Attfield, Taylor's Toxicology.
Medical Jurisprudence. Gray, Beck, Taylor, Wharton, and Stillé.
Pathology. William's Principles, Virchow, Paget, Craigie.
Clinical Medicine. Groves, Trosseau.

V. LIST OF MATRICULATES AND GRADUATES OF THE ECLECTIC MEDICAL COLLEGE OF PHILADELPHIA—PHILADELPHIA UNIVERSITY OF MEDICINE AND SURGERY

The letters M.D. indicate that the degree of Doctor of Medicine was conferred in the year stated immediately following the degree by the Eclectic Medical College of Philadelphia (or by the Philadelphia University of Medicine and Surgery, after the change in the name of the college). The absence of M.D. after a name means that available records show only that the person named was a matriculate in the year given. For the years 1870, 1, 2, 3, 4, 6, 7, 8, 9 and 80 complete data have not yet been found, although the search continues. A question mark following a name means that sources differ about that person.

Honorary degrees are so noted. An asterisk after a name means that the graduate later won distinction as a teacher or practitioner. Parentheses indicate variant spellings.

Most of the announcements and journals from which the data for this list are drawn have been assembled by the Library of the College of Physicians of Philadelphia, the National Library of Medicine in Bethesda, Maryland, and the New York Academy of Medicine. The chief sources are The Eclectic Medical Journal of Philadelphia, and its successor, The Philadelphia University Journal of Medicine and Surgery.

Abbey, E. C., M.D., '63
New York
Abney, E. S. '67, '68, '69
South (North) Carolina
Aborn, E. S., M.D., '64
Pennsylvania
Aborn, E. S. '63
California
Adair, Charles H., M.D., '71
Indiana
Adams, N. R., M.D., '71 *ad eundem*
Ohio
Adams, Nathan '63
Pennsylvania
Adams, S. P., M.D., '69
Texas
Adamson, J. B. '67, '68, '69
Pennsylvania
Ader, Henry, M.D., '69
Indiana
Akeley (Akely), John S. '66, '67, '68, '69
New York
Alexander, John '64
Pennsylvania
Allen, Peter A., M.D., '62
New York
Alvord, Hiram, M.D., '67
Indiana
Anders, W. K. '68, '69
North Carolina
Anderson, D. M. '74
Philadelphia
Andres, R., Jr., M.D., '61
New York
Andrews, Edwin E., M.D., '60
New York
Andrews, J. B., M.D., '71
Pennsylvania
Andrews, T. P., M.D., '66
Pennsylvania
Archer, W. A. '68, '69
North Carolina
Armstrong, William, M.D., '61
Pennsylvania
Arnold, Daniel, M.D., '66
Ohio
Arnold, G. L. '61
Ohio
Arnold, P. J. '68, '69
Texas
Artherholt, D. H. '63
Ohio
Aswell, D. S., M.D., '69
Louisiana
Atkins, Lyman, M.D., '66
Indiana
Atkinson, Charles P., M.D., '66
New Jersey
Austin, William '61
Pennsylvania
Auvache, Thomas E., M.D., '69
Philadelphia

Axt, Frederick, M.D., '60
Pennsylvania

Babcock, Cyrus, M.D., '66
New York
Babcock, George D. '62
Connecticut
Backa(e)stae, J. P., M.D., '64
Indiana
Bacon, Augustus E., M.D., '69
Michigan
Bagge, Samuel Gordon, M.D., '60
Pennsylvania
Bailey, Morris, M.D., '65
Vermont (Connecticut)
Baily, Leonard '63
Connecticut
Baker, C. L., M.D., '69
New York
Baker, C. M. '66, '67, '68, '69
Pennsylvania
Baker, E. L., M.D., '69
New York
Baker, Frank A. '68, '69
Philadelphia
Baker, Oscar L. '65, '66
(Pennsylvania, Ohio)
Balch, Edward T., M.D., '65
New York
Baldwin, W. H. '60
Nebraska
Bancroft, William M., M.D., '71
Pennsylvania
Band, Charles '65
Michigan
Barkey, Peter, M.D., '71, A.M., '71
Standville, Canada
Barnes, T. B. '69
Philadelphia
Barret(t), W. (V.), M.D., '69 *ad eundem*
Ohio
Barrett, George N. '60
Massachusetts
Barrows, A. R. '64
Pennsylvania
Barrows, P. J. '64
New York
Bartlett, A. A. '63
Pennsylvania
Bartlett, Bradley H., M.D., '66
Maine
Bascom, E. F. '64
Maine
Bascom, J. Kirk, M.D., '69 *ad eundem*
(Maine, New Hampshire)
Bassett,* Eugene A., M.D., '63
Massachusetts

Bayard, H. M., M.D., '64
Pennsylvania
Beach, L. U., M.D., '64
Pennsylvania
Beam, J. C. '64
Pennsylvania
Beam, L. T. '65
Pennsylvania
Beamer, John B., M.D., '69
Ohio
Bean, L. F., M.D., '66
Pennsylvania
Bean, T. S. '63
Canada West
Beck, J. '64
Pennsylvania
Beck, Joseph, M.D., '67
New York
Beck, Samuel T. E., M.D., '67
New York
Belden, Calvin, M.D., '60
Ohio
Belknap, E. G., M.D., '67
Pennsylvania
Bell, Samuel A. '60, '61, '62, '63
Pennsylvania
Bell, S. A., M.D., '69
North Carolina
Beltz, Daniel E., M.D., '65
(Washington D. C., Pennsylvania)
Bennett, Asa A., M.D., '61
New York
Bennett, Emerson, Jr. '74
Philadelphia
Bentl(e)y, Jesse E. '66, '69
Pennsylvania
Bertholet, J. L. '63
New York
Betts, G. '67, '68, '69
Pennsylvania
Betts, J. N., M.D., '69
New York
Beuneb, A. A. '60
New York
Bick(h)ley, G. G., M.D., '63
Pennsylvania
Biddle, Henry D. '66, '68, '69
Philadelphia
Biddle(el), W. B. '64
New Jersey
Bigelow, James H., M.D., '69
Pennsylvania
Bigelow, S. G. '61
Ohio
Biggar, Hamilton F., M.D., '69
Ohio
Birch, Joseph (James) '67, '68, '69

Bisbee, J. A. '74
Philadelphia
Bisbee, M. G. '74
Philadelphia
Bittle, William, M.D., '61
Pennsylvania
Black, James T., M.D., '69
Pennsylvania
Blake, D. A., M.D., '64
Pennsylvania
Blake, D. W. '63
Pennsylvania
Blake, J. A. D., (M.D.), '64
Pennsylvania
Blake, Thomas F., M.D., '61, '61
Maryland
Blake, Thomas, (M.D.), '61
Pennsylvania
Blaney, J. V. Z., (M.D.), '66
Indiana
Bolles,* H. A., M.D., '64
New York
Bolles, Hiram O., M.D., '65
Illinois
Booker, John C. '66
Virginia
Borland,* J. R., M.D., '65
Pennsylvania
Bosworth, H. B. (F)., M.D., '64
Ohio
Bowen, A. F., M.D., '64
Pennsylvania
Bower, Joshua '66, '67, '68, '69
Ohio
Bower, William '60
Pennsylvania
Bowerman, S. B. '60
Pennsylvania
Bowie, Alonzo P., M.D., '69
Pennsylvania
Bowles, Harvey Edward, M.D., '60, '60
Canada West (Pennsylvania)
Boyd, Robert A., M.D., '67
Pennsylvania
Bradford, Charles S., M.D., '71
Massachusetts
Bradford, Leo J., M.D., '65
Pennsylvania
Bradway, Willard '65, '67, '69
Brainard, A. C. '61
Ohio (England)
Bramhall, M. E., M.D., '75
Philadelphia
Meningitis
Brandridge, D. F. '60
Pennsylvania
Brecht, Samuel S., M.D., '69
Pennsylvania
Brick, Francis, M.D., '65
New Hampshire
Bridgland, R. '68, '69
Ohio
Bridg(e)land, Samuel, M.D., '67
Ohio (Ontario)
Brookins, Andrew B., M.D., '69
Florida
Brooks, John '68, '69
Pennsylvania
Broox, John '66, '68, '69
Pennsylvania
Brown, David S. '64
Pennsylvania
Brown, G. W. J. '68, '69
Pennsylvania
Brown, George W. '60, '61, '64
Ohio
Brown, H. H., M.D., '69
Maine
Brown, James E., M.D., '64
Pennsylvania
Brown, John '59
Ohio
Brown, W. B. '68, '69
Pennsylvania
Brown, William '64
Massachusetts
Browne, I. (J) M. F., M.D., '66
Mississippi
Brumbaugh, P. P. '62
Pennsylvania
Brunner, Henry, Sr. '65
Pennsylvania
Buchanan, James Jr. '59
Pennsylvania
Buckley, C., M.D. '66
Pennsylvania
(New York)
Budlong, William H., M.D., '60, '60
Rhode Island
(Pennsylvania)
Buechly, G. G. '60
Pennsylvania
Buell, James K., M.D., '69
Ohio
Buell, S. A. '68, '69
Tennessee
Bullis, C. S. '62
Canada
Bullock, Andrew Dexter, M.D., '66
Massachusetts
Burgner, Samuel H., M.D., '60
Ohio

Burhans, Laura M., M.D., '75
Kansas
Common Colds
Burhans, William M., M.D., '75
Kansas
True healing art unknown
Burns, G. W., M.D., '69
Pennsylvania
Burns, W. L. '67, '68, '69
North Carolina
Burr, Howard C. '61
Pennsylvania
Burrows, P. J. '64
New York
Butler, P. '60
Michigan
Buz(z)ard, Samuel, M.D., '71
Pennsylvania (Iowa)
Byrns, W. L., M.D., '69
North Carolina

Caldwell, W. M., M.D., '66
Ohio
Callahan, J. C., M.D., '63
Ohio
Callahan, P. J., M.D., '60
Ohio
Callahan, T. J. '62
Pennsylvania
Calver, George W. H., M.D., '62
Pennsylvania
Calver, William, M.D., '64
Pennsylvania
Calvo y Castellano, Pedro, M.D., '75
Cuba
Ether
Camp, S. G. '60
Massachusetts
Candler, James M. '67
North Carolina
Canfield, Benton H. '66, '68, '69
New York
Canfield, Henry M. '61
Ohio
Card, James C., M.D., '61
Pennsylvania
Carder, D. D., M.D., '69
Ontario
Car(e)y, H. M. '67, '68, '69
Ohio
Carr, W. S., M.D., '69
Arizona (Philadelphia)
Case, L. F., M.D., '71
Owatonna, Minnesota
Chapman, P. L. '64
New York
Cheney, Nelson, M.D., '67
Canada East

Chestnutwood, Augustus '65
Pennsylvania
Chiles, Edward, M.D., '75
Philadelphia
Diarrhoea, Dysentery, Cholera Morbus and Asiatica; their causes, symptoms and successful treatment.
Christine, J. S. '59
Pennsylvania
Clapp, M. (T)H. '60
Maine (Vermont)
Clark, C. '60
Indiana
Clark, Thomas '59
Louisiana
Clark, William '59
Massachusetts
Clark, William F. '63
Pennsylvania
Closson, A. L. (S), M.D., '63
Pennsylvania
Clover, William M., (M.D.) M.D., '64, '65, Master of Surgery, '71
Pennsylvania
Clowes, John Q. A., M.D., '69
Pennsylvania
Clumpp, S. G. '60
Massachusetts
Coble, J.,W., M.D., '67
Pennsylvania
Coble, J. W. '68, '69
Pennsylvania
Coburn,* William C., M.D., '65
Pennsylvania
Collier, Levin Dashiell, M.D., '69 *ad eundem*
Maryland
Compton, J. Lewis, M.D., '66
Maryland
Cook, C. M. '60
Ohio
Cook, J. A. '68, '69
Tennessee
Cook, J. M. '63
Massachusetts
Coole(d)ge, H. C. '64
Vermont
Coons, Rufus, M.D., '62
New York
Cooper, William M., (M.D.), '63
New Jersey
Cope, A. L., M.D., '71
Pennsylvania
Cornell, S. S., Honorary M.D., '62
Canada West
Corn(w)ell, H. S., M.D., '61
Massachusetts
Coulter, James B. '74
Kansas

Cowden, J. P., '64
Ohio
Cowles, James Perkins, M.D., '60
New York
Cowles, Thomas '60
Maine
Cowling, James, M.D., '69
New,York
Coyle, C. L., M.D., '69
Ohio
Craig, William H., M.D., '62
Ireland (Pennsylvania)
Crandall, R. P., M.D., '66
New York
Cress, James, M.D., '62
Pennsylvania
Cress, James, M.D., '60, '60, '61
Delaware (Pennsylvania)
Crockett, Frederick E., M.D., '67
Maine
Cross, L. M. '61
Vermont
Culp, Samuel '63
Indiana
Culp, S. C., M.D., '71
Michigan
Curta(i)n, Michael '60, '61
Pennsylvania

Dalmas, Charles J. '61
Pennsylvania
Dalton, G. E. (J. E.), M.D., '64
Pennsylvania
Dalton,* E. G., M.D., '61
Pennsylvania
Daniels, C. P. '60
Ohio
Daniels, L. A., M.D., '65
Ohio
Daolis, E. '62
Ohio
Darmon, Charles Henry '74
Philadelphia
Davis, Gladson, (M.D.), '63
Ohio
Davis, John T., M.D., '62
Pennsylvania
Davis, Judson, M.D., '64
Ohio
Davis, Judson, M.D., '60, '60
Ohio
Davis, Robert '59
Alabama
Davidson, James, M.D., '67
Ohio
Davidson, James '60
Ohio
Davidson, Thomas J. '67, '68, '69
Pennsylvania
Davidson, W. C. '66
Delaware
Davy, Humphrey '74
Philadelphia
Day, George H., M.D., '64, '64
Maine
de Leon y Ruiz, Ramon, M.D., '75
Cuba
Fever
Dickerson, J. H. '68, '69
Illinois
Dickerson, Jacob Townsend, M.D., '60
Delaware
Dicks, C. P. '60
Missouri
Dicks, D. C. '66
North Carolina
Dickson, George '64
Pennsylvania
Dildine, Z., M.D., '63
New York
Divver, R. F., M.D., '69
South Carolina
Dolton, C. J. '62
Ohio
Donaldson, Fielding, M.D., '69
Pennsylvania
Doran, Charles K. '59
Pennsylvania
Dorn, Samuel '60
Iowa
Doucet,* Homer J., M.D., '63
Massachusetts
Douglas(s), George '60, '61, '63
Pennsylvania
Downs, Isaac M., M.D., '64
New Jersey (New York)
Downs, J. M., M.D., '65
Maryland
Dreher, J. C. '68, '69
Ohio
Dreibelbis, D. L., M.D., '65
Pennsylvania
Drew, A. Edgar, M.D., '69
Ontaria
Duell, James '64
Ohio
Duff, W. L., M.D., '69
Pennsylvania
Duncan, J. '62
Pennsylvania
Dunlap, R., Honorary M.D., '71
Michigan
Durand, W. R. '67, '68, '69
Durden, W. W., M.D., '69
Mississippi (Kentucky)

Durkin, Austen, M.D., '71
Pennsylvania
Durnell, James '67, '68, '69
Philadelphia

Eardensoh(ho)n, George, M.D., '69 *ad eundem*
New York
Emmons, Joshua H. '67, '68, '69
Connecticut
(Pennsylvania)
Enterline, Samuel, M.D., '69
Maryland
Entrike(i)ns, William M. '59, '60
Pennsylvania
Entrikin, F. W., M.D., '71
Ohio
Eppley, George W., M.D., '69
Pennsylvania
Estabrook, C. A., M.D., '67
Ohio
Evans, B. D. '67, '68, '69
Ohio
Evans, J. M., M.D., '71 *ad eundem*
Everson, John C., M.D., '69
Pennsylvania
Ewell, J. E. T., M.D., '65
Maryland
Ewing, Cicero M., M.D., '66
Pennsylvania
Ewings, Robert '61
Iowa (Illinois)

Fahrney, Peter D., M.D., '67
Maryland
Faloon, Matthew, M.D., '60
Indiana
Faloon, Matthew, M.D., ('64, '65), ('64)
Illinois
Farr, E. D., (M.D.), '61
New Jersey
Fields, A. P., M.D., '66
Pennsylvania
Fiester, J. N., M.D., '67
Ohio
Fike, Charles C. '74
Philadelphia
Finch, Phinney, M.D., '71
New York
Fixon, T. F., M.D., '69
North Carolina
Flemming, D. L., M.D., '69
Philadelphia
Flemming, D. L., '67
New York
Flemming, D. S. '68, '69
Floor, Frank V., M.D., '69 *ad eundem*
Pennsylvania
Flower, P. D., '68, '69
Pennsylvania
Flower, W. S. '68, '69
Ohio
Foertsch, Jacob, M.D., '69 *ad eundem*
New York
Ford, Charles L. '66, '68, '69
Pennsylvania
Ford, William H. '66, '68, '69
Ohio
Foster, William '60
Ohio
France, Cyrus W., M.D., '71
Pennsylvania
Frankel, Julius '74
Philadelphia
Fredericks, John '65
New Hampshire
Frisbee, H. F. '60
Kansas
Fry, J. M. (W), M.D., '67
Ohio
Furey, Enos F., M.D., '65
New Jersey

Gaily, Watson '63
Pennsylvania
Gale, Harry S. '74
Port Richmond, New York
Ga(a)rder, O. V., M.D., '69
Wisconsin
Garret(t)son, Eli, M.D., '64
Ohio
Garver, Levi '68, '69
Pennsylvania
Garvin, E. F., M.D., '64
Pennsylvania
Gates, George S. (L)., M.D., '69
New York
Gazley, Henry C., M.D., '64
New York
George, H. S., M.D., '71 *ad eundem*
Pennsylvania
Gilbert, Frederick '67, '68, '69
Iowa
Gilbert, J. F., M.D., '71
Nebraska
Giles, J. E. '68, '69
Illinois
Gillard, Frederick '68, '69
Philadelphia
Gladding, S. P. '61
Missouri
Gordon, Richard '59
New Jersey
Gorski(e), Alexander T., M.D., '69
Prussia
Goss, I. J. M., M.D., '69
Georgia

Gottlieb (Jobblieb), F. '64
Pennsylvania
Grant, Thomas '74
Robertsonville, New York
Greene, E. H., M.D., '67
Indiana
Greene, E. H. '63
Ohio
Greene, R., (M.D.), '64
Massachusetts
Gridley, Francis D., M.D., '66
New York
Griffith, Charles S. '61
Indiana
Griffith, John P.(K) '60, '61, '62, '63
Pennsylvania
Grindle, W. '68, '69
Philadelphia
Gudger, David M., M.D., '69
North Carolina
Guillot, P. J. '68, '69
Pennsylvania

Hacker, F.(J) S. '61, '64
Pennsylvania
Hacker, Theodore S. '61
Pennsylvania
Haines, Edward C., M.D., '69
New Jersey
Halderman, A. F. '66
Ohio
Hallman, J. S., M.D., '69
Pennsylvania
Hamaker, D. S. '62
Pennsylvania
Hambright, J. P. '68, '69
North Carolina
Hamilton, R. P. '59
New York
Hamling, J. P. '68, '69
North Carolina
Hance, R. A. '61
Pennsylvania
Hank, William '61
Massachusetts
Hanokins, H. M. '60
New Hampshire
Hargreaves,* William, M.D., '63
Pennsylvania
Hargreaves, William, M.D., '66
Pennsylvania
Harper, Henry, M.D., '62, '62
Pennsylvania
Harris, Elijah N., M.D., '69
Michigan
Harris, George M., M.D., '75
New Jersey
Medical observations in South Kansas
Harris, George M.(W) '66, '68, '69
Philadelphia (New Jersey)
Hart, H. Clay, M.D., '69
Ohio
Hart, (T. M. J.; J. M.) '60, '61
Rhode Island
Hartwell, J. M. '64
New Hampshire
Harvey, James B. '67, '68, '69
Massachusetts
Harvey, Leander, M.D., '65
Canada West
Hassinger, Albert, M.D., '69
Philadelphia
Hastings, E. H., M.D., '65
Pennsylvania
Hathaway, William F. '67, '68, '69
Philadelphia
Hauverman, Alanson Duane, M.D., '71
Georgia
Hawley,* James A., M.D., '62
New York (Minnesota)
Hayes, Albert Hamilton, M.D., '75
Alton, New Hampshire
Hernia
Hays, William M., (M.D.), '63
Pennsylvania
Heath, M. M. '61
Pennsylvania
Heaton,* Charles E., M.D., '65
New York
Hecks, Peter M. '60
California
Henes(z)ey, S. C., M.D., '69
Delaware
Herbert, T. G.(J.), M.D., '69
North Carolina
Heritage, Josiah F.(S), M.D., '64
New York (New Jersey)
Hester, G. '67
Pennsylvania
Hicks, Darius, M.D., '61
Rhode Island
Higgins, L. M. '60
North Carolina
Hill, William, M.D., '65
New York (Indiana)
Hinkle, George, M.D., '64
Pennsylvania
Holbrook, Charles '69
Philadelphia
Holcomb, H. C.(G.), M.D., '69
Ohio
Holden, L. P., M.D., '64
Massachusetts
Holmes, George '60
New York

Holmes, James '60
Illinois
Hollowbush, J. '63
Pennsylvania
Hood, G. H. '60
New York
Hoogland, Abraham, M.D., '69 *ad eundem*
Ohio (New York)
Hopwood, M. W.(H), M.D., '69
Iowa
Horton, E. M. '60
Iowa
Houston, Samuel '67, '68, '69
Texas
Howard, W., M.D., '67
Izard, New Jersey
Howe, Joseph S., M.D., '69
Pennsylvania
Howell, Francis T. '59, '60
Pennsylvania
Hubbard, Henry, M.D., '67
Ohio
Hubbell, R., M.D., '66
New Jersey (New York)
Hugg (Hugh), Isaac (M., N.), M.D., '69
New Jersey
Hulburt (Hulbert, Hurlbut), F. B., M.D., '69
Pennsylvania
Hulburt, M. J. E., M.D., '69
Illinois (New York)
Hull, A. W. '61
Pennsylvania
Hunter, Henry Thomas, M.D., '69
Ohio
Hunter, John, M.D., '69
Michigan
Huntsinger, Abram, M.D., '66
Indiana
Huntsinger, Eli, M.D., '65
Indiana
Hunt, R. S., M.D., '69
Pennsylvania
Hutchin(g)s, George W. '67, '68, '69
Hutchinson, E. '64
Maine
Hutchinson, J. W., M.D., '71
Mishawaka, Indiana

Ingraham, S. C.(L) '67, '68, '69
Philadelphia
Irwin, J. G. '68, '69
Ohio
Iszard, W. Howard '66
New Jersey

Jack, W. Lindsay, M.D., '71
Pennsylvania
Jackson, W. B. '68, '69
Mississippi
Jacobus, P. N., M.D., '62
New Jersey
Jacoby, Frederick, M.D., '62
Pennsylvania
Jacoby, George F.(T), M.D., '62
Pennsylvania
Jahn(c)ke, George P.(F), M.D., '64
New Jersey
Johnson, Corydon C.(O), M.D., '64
New York
Johnson, James P., M.D., '65
New York
Johnson, William John '61
England
Johnston, S. F.(H), M.D., '69
New Jersey
Joiner, Robert, M.D., '75
Beauford, North Carolina
Phthisis
Jolley, L., M.D., '67
Iowa
Jones, Caper(s) C. '67, '68, '69
Alabama
Jones, L. C., (M.D.), '60
Ohio
Jones,* William B.(P), M.D., '61
Pennsylvania
Jones, William B., M.D., '69
Philadelphia
Jordan, George W., M.D., '75
Philadelphia
Ceanothus Americanus
Jordan, J. H. '66, '68, '69
Indiana
Jordan, Samuel, M.D., '67
New York
Judson, C. '62
Ohio

Kaemmerer, A. C., M.D., '69 *ad eundem*
New York
Karsner, Charles W., M.D., '69
Philadelphia
Keith, George W., M.D., '69
Massachusetts
Kensil, Rowland T., M.D., '60, '60
Pennsylvania
Kermott, John Wesley, M.D., '67
Michigan
Kerns, Joseph '59, '60, '61
Pennsylvania
Kerns, M. C. '62
Michigan
Keyser, C. W. J.(I) '66, '68, '69
Pennsylvania

Keyser, George H., M.D., '65
Pennsylvania
Killgore,* James L., M.D., '65
Delaware
King, J. H. '67, '68, '69
North Carolina
King, Robert L., M.D., '66
Ohio
Kinsley, John, M.D., '66
New Jersey
Kirk, A. S. '59
Mississippi
Kirk, J., M.D., '69
New Hampshire
Kish, C. A., M.D., '64
Pennsylvania
Kline, R. H., M.D., '62
Indiana
Kline, R. H., M.D., '66
Pennsylvania
Kohlbach, S. H., M.D., '69
Kohler, Frederick S., M.D., '60
Pennsylvania
Kolloch, N. H., M.D., '69
U. S. Army
Krosen, W. B. '64
Pennsylvania

Lace, John J.(I) '65
New York
LaCossit(t), H. D., M.D., '69
Pennsylvania
Laflin, H. B. '66, '68, '69
Illinois (Minnesota)
Lake, Dr. S. K. '68, '69
Canada West
Lambart, L. '60
Texas
Landrum, J. B. O., M.D., '69
South Carolina
Lane, Charles J., M.D., '64
Michigan
Lane, William A., M.D., '67
Michigan
Langdon, Warren C., M.D., '63
New York
Langford, A. F.(T), M.D., '69
South Carolina (Pennsylvania)
Laning, Joseph S.(T), M.D., '63
Pennsylvania (New Jersey)
Laning, M. B. '65
Pennsylvania
Lape, A. A., M.D., '65
Pennsylvania
Lape, S. K. '66
Canada West
Lawrence, E. W., M.D., '63
New Jersey
Ledyard, E. A. '66
Pennsylvania
Le(a)ming, J. H., M.D., '63
Ohio
Leslie, A. J., M.D., '66
Ohio
Levis, J. C., M.D., '67
Pennsylvania
Lewis, J. M., M.D., '75
New York
(Victoria Square, Ontario)
Cholera Infantum
Lewis, Thomas '59
Pennsylvania
Libeh, J. L. '61
Pennsylvania
Liebert, Henry, M.D., '71
Pennsylvania
Lippincott, Joshua, M.D., '75
Philadelphia (Woodstown, New Jersey)
Electro Therapeutics, original cases
Litch, J. L. '61
Pennsylvania
Livingood, J. J. '62
Pennsylvania
Livingston, J. F., M.D., '65
Pennsylvania
Livingston, L. '68, '69
New York
Lockwood, John '64
Delaware
Long, J., (M.D.), '62
Pennsylvania
Long, John D. '59, '64
Pennsylvania
Loomis, C. O. '74
Philadelphia
Loomis,* D. A., M.D., '64
New York
Loomis, G. L. '63
New York
Lord, M. M. '66
Pennsylvania
Lour, Edwin '64
Pennsylvania
Louther,* James M., M.D., '65
Pennsylvania
Lucas, W. H. G., M.D., '69
North Carolina
Lukens, J. D. '66
Pennsylvania
Luke(s), Emil C., M.D., '69
Pennsylvania
Lund, S. F. '63
New Jersey
Lunn, B. V. '68, '69
Tennessee (Texas)

Lunney, John, M.D., '64
Pennsylvania
Lutes, Walter, M.D., '66
Canada West
Lyford, B. F. '64
Washington, D. C.
Lynch, N. R. (R.N.), M.D., '61, '66
Delaware (Pennsylvania)

Maha(o)n, Oliver P., M.D., '65
Indiana
Mahon, John A., M.D., '69
Virginia
Major, William, M.D., '65
Pennsylvania
Malle(i)tte(i), George P. '60
Pennsylvania
Malone, D. R., M.D., '65, A.M., '71
Indiana
Maloney, Nelson, M.D., '69
Illinois (Pennsylvania)
Mandeville, Edgar M.(W), M.D., '63
New York
Manford, E. '68, '69
Illinois
Manly, Bradford Sherman, M.D., '60
Vermont
Manly (Marcus Marcellus, Marcellus Marcus), M.D., '60
Vermont
Manly, Orville, M.D., '62
Ohio
Manly, William Judson, M.D., '60
Louisiana
Mann, A. '60
Pennsylvania
Mann, Walter '60
Ohio
Mansfield, Isaac LeRoy, M.D., '69
Philadelphia (New York)
Mansfield, Mike, M.D., '67
Pennsylvania
Mapes, Levi '60
Canada West
Marley, John '66, '68, '69
Pennsylvania
Marple, S. W., M.D., '69
New Jersey (Illinois)
Marriott, G. W., (D. D.), '61
Pennsylvania
Marriott, G. W., Honorary M.D., '62
Pennsylvania
Martin, S. J., M.D., '63
Vermont
Mason, S. A., M.D., '69
New Hampshire
(Michigan, Philadelphia)
Masterson, Byron O. '67, '68, '69
Alabama
Masterson, J. T. '68, '69
Alabama
Mat(t)hews, Levi P. '60
Vermont
Matthews, T. L. '67, '68, '69
Philadelphia
Matthews, William H., M.D., '65
Philadelphia
May, Z. K., M.D., '61
New York
McAuley, A. G. '69
Philadelphia
McBride, William, M.D., '69
Philadelphia
McCain, H. '68
Kansas
McCandle, James '68, '69
North Carolina
McCandless, James '59
Philadelphia
McCandless, James '68, '69
North Carolina
McClintock, Jesse R. B., M.D., '62
Pennsylvania
McClintock, Theodore '63, '65
Pennsylvania
McCluskey, William H. '63, '64
Ohio
McConnehey, David, M.D., '69
Indiana
McCormick, Harry Clay, M.D., '71
Maryland
McCormick, J. H. '66, '68, '69
Pennsylvania
McCourt, James '64
Philadelphia
McCready, Andrew, M.D., '75
Martinsburg, Pennsylvania
Dyspepsia
McCrory, George '62
Pennsylvania
McDonald, Archibald E., M.D., '63
Massachusetts
McDougal, E., M.D., '69
New York
McDougan, William '67, '68, '69
North Carolina
McEvoy, Mike '66
Pennsylvania
McGregory, W. D., M.D., '69
Ohio
McInnes, Neil '74
Philadelphia
McIntosh, John Wesley, M.D., '60
North Carolina
McIntosh, John '65
New York

McKay, J. L. '68, '69
North Carolina
McKean, John A., Jr., '67, '68, '69
Philadelphia
McKee, D. B. '68, '69
Pennsylvania
McKee, James Lea(e), M.D., '62
Pennsylvania
McKee, Milton '68, '69
Pennsylvania
McKenzie, J. H., M.D., '64
New York
McKinley, H. C. '64
Maryland
McKnight, W. J. '68, '69
Pennsylvania
McLean, Hugh '67, '68, '69
McLaughlin, J. T. '68, '69
Illinois
McLaughlin, Robert, M.D., '67
Canada West
McMahon, J. W. '64
Pennsylvania
McQuillan, Robert, M.D., '66
Canada West
Meacham, E. T., M.D., '67
Meacham, F. S. '60
Ohio
Meals, Isaiah, M.D., '69
Pennsylvania
Mease, I. W., M.D., '69
Pennsylvania
Mease, Urban G., M.D., '69
New York
Mellinger, H. J. '64
Pennsylvania
Merkle(el), Solomon B. '67, '68, '69
Pennsylvania
Merrell,* William S., Honorary M.D., '62
Ohio
Meyer(s), Leo '68, '69
New York
Meyers, C. L. '60
Iowa
Meyers, D. E. '63
Meyers, J. C., M.D., '63
Ohio
Meyers, William H., M.D., '62
Pennsylvania
Michener,* James C., M.D., '65
Pennsylvania
Millary, James '62
Pennsylvania
Miller, E. Calvin, M.D., '69
Pennsylvania
Miller, E. S. '67, '68, '69
Tennessee
Miller, George M., M.D., '63
Pennsylvania
Miller, James '60, '61
Pennsylvania
Miller, L. C. '61
Ohio
Miller, Thomas B., M.D., '66
Philadelphia
Millinger, J. H. '64
Pennsylvania
Milner, Alfred '60
Illinois
Mine(o)r, A. G., M.D., '61
Missouri
Mitchell, Isabel M. '74
Philadelphia
Mo(o)re, David, Dr. '63, '64, '65
New Jersey
Moore, J. S. '65
Pennsylvania
Moore, Walter C., M.D., '65
Pennsylvania
Moore, William McLeon '66
Pennsylvania
More, Henry '61
Ohio
Morehouse, E. M., M.D., '66
Mon. Ty.
Morgan, Cyrus Richard '60, '61, '64
Massachusetts (New Jersey)
Morgan, S. M. '61
Massachusetts
Morrell,* W. S., Honorary M.D., '62
Morrill, Frederick, M.D., '69
Massachusetts
Morris, A. J., M.D., '67
Pennsylvania
Morris, J. R. '63
Pennsylvania
Morris, S. D. '60
New York
Morris, W. B. '67, '68, '69
Pennsylvania
Morriston, Joseph, M.D., '66
Canada West
Morton, C. P. '60
Alabama
Morton, Robert B. '63
Pennsylvania
Mos(c)her, Theodore (Thomas), J., M.D., '69
Ohio
Mountain, W. S. '68, '69
Pennsylvania
Mower, C. R. '60
Ohio
Mulligan, Patrick J., M.D., '60
Florida

Murdock, Solomon K. '66, '68, '69
Pennsylvania
Murphy, T. W., M.D., '71
Pennsylvania
Myers, D. W. '67
New York

Nafe, G. W., M.D., '71
Indiana
Nance, A. L., M.D., '69
Georgia
Newell, James '67
New York (Ontario)
Newton, A. W. R., M.D., '71 *ad eundem*
Massachusetts
Nichlow, W. J. '60
Ohio
Nichol(l)s, A. B. C., M.D., '69
South Carolina (North Carolina, Tennessee)
Nixon, (J. T.; T. F.), M.D., '69
North Carolina
Nintzel, R. N., M.D., '69 *ad eundem*
Pennsylvania
Noetling, John, M.D., '61
Pennsylvania

O'Brien, S. M. '68, '69
New York
O'Connell, P. J. '67, '68, '69
South Carolina (North Carolina)
O'Conner, Byron R., M.D., '67
Indiana
Oldshue, T. L., M.D., '69
Pennsylvania
O'Leary, J. F. '68, '69
Tennessee
Oliver, Andrew, M.D., '71
Pennsylvania
Oliver, Douglass H. '61
New York
Oliver, L. '62
Illinois
Ordway, B. H., M.D., '67
Maine
Orr, Andrew '66, '67, '68, '69
Philadelphia
Orr, Samuel S.(L), Jr., M.D., '69
U. S. Army (Philadelphia)
Orr, Samuel, Jr., M.D., '61, '61
Pennsylvania
Orvis, William B., M.D., '75
Atlanta, Illinois
Hints in Practice
O'Shea, M. F. '66
Pennsylvania
Osmon, S. O. '60
North Carolina

Pagin, David '68, '69
Indiana
Paine, C. W. '74
Philadelphia
Paine, Oliver D.(W), M.D., '60
Ohio
Pape, E. D., M.D., '69
New York
Patton, J. B., M.D., '69
Pennsylvania
Paun, Amos B.(R) '65, '66, '68, '69
Massachusetts
Pearce, John C. '66
Delaware
Peck, H. E. '68, '69
New Jersey
Peirce, R. V. '62
Pennsylvania
Peper, Henry Brown, M.D., '65
Perkins, T. Spencer, Honorary M.D., '67
Massachusetts
Perkins,* T. Spencer, M.D., '61
Massachusetts
Peters, George '61
Michigan
Petroff, Emil(e) J. '67, '68, '69
Philadelphia
Pettingill, John B. '66, '67, '68, '69
Philadelphia
Pierce, J. O.(W), M.D., '69
Delaware
Pierce, R. Vaugh (Y.) '68, '69
Pennsylvania
Pierce,* R. V. Y., M.D., '65
Pennsylvania
Pingree, Merill G., M.D., '69
Philadelphia
Pingrove, M. G. '67
Pennsylvania
Piper, H. B., M.D., '66
Pennsylvania
Pitcher, A. O. '65
Iowa
Plowman, Moss S., M.D., '69
Philadelphia
Plummley, G. W. '65
Vermont
Pope, E. D., M.D., '69 *ad eundem*
New York
Porter, A. C. '66, '68, '69
New York
Porter, Cass M. '64
Ohio
Porter, C. M., M.D., '71
Pennsylvania
Porter, E. O. '65
Pennsylvania

Pratt, David C. '60
Massachusetts
Pratt, D. L., M.D., '65
Pennsylvania
Pratz y Sascorts, Antonio, M.D., '75
Cuba
Pneumonia
Preston, M. Milnor, M.D., '69
Philadelphia
Prettyman (Paettyman), Edward K., M.D., '69
Delaware
Pretzinger, Jacob, M.D., '62
Ohio
Price, Henry C., M.D., '62
Ohio
Price, J.(I) E. '67, '68, '69
Tennessee
Price,* Marshall F., M.D., '62
Illinois
Priest, S. G. '64
Massachusetts
Proudley, G. W., M.D., '67
Pennsylvania (Indiana)
Pugh, Reece, M.D., '67
Pennsylvania
Pursell, Howard '64
New Jersey
Purviance, J. F.(I), M.D., '65
Ohio

Quillan, I. W. '68, '69
North Carolina

Radway, John, M.D., '67
New York
Ramsay, Robert, M.D., '69
Ohio
Rankin G. F.(T), M.D., '69
Pennsylvania
Reasner,* Francis M., M.D., '64
Michigan
Record, Henry A., M.D., '65
Pennsylvania
Reed, W. F. '66
Pennsylvania
Reifsnyder, Francis B., M.D., '69
Ohio
Remington, W. B., M.D., '71
New York
Reynolds, B. F., M.D., '65
Iowa
Reynolds, Richard, M.D., '61
Pennsylvania
Reynolds, S. F. '59
Pennsylvania
Rhoback, G. '68, '69
Pennsylvania
Rhodes, J. H. '68, '69
Pennsylvania
Rice, S. T. '60
Illinois
Richmond, S. H., M.D., '71
Illinois
Rinehart, S., Master of Surgery, '71
Michigan
Ripley, W. W. '74
Philadelphia
Rising, C. L. '62
Pennsylvania
Roberts, Charles B., M.D., '62
California (Pennsylvania)
Roberts, H. Clay '63
Pennsylvania
Roberts, Joseph J., M.D., '67
Pennsylvania
Roberts, James A. '59
Virginia
Roberts, L. P. '66
Pennsylvania
Roberts, M. P. '67, '68, '69
North Carolina
Roberts, Watson '63
Iowa
Robillard, Edmund, M.D., '69
Ontario
Robinson, M. Emmet, '67, '68, '69
North Carolina
Robinson, Newton, M.D., '69
North Carolina
Robinson, W. C. '60
Pennsylvania
Robinson, W. P., M.D., '69
Ohio
Rogers, George H., M.D., '65
Ohio
Rogers, H. N., M.D., '64
Wisconsin
Rogers, Samuel, M.D., '67
Pennsylvania
Roh(l)(b)ack(h), A. B.(G) '67, '68, '69
Pennsylvania (Texas)
Rolbach, S. H., M.D., '69
Roney, W. C., M.D., ('64, '65)
Pennsylvania
Roney, W. C. '68, '69
New York
Roney, W. C., (M.D.), '63
Pennsylvania
Rorrey, W. C., (M.D.), '63
Pennsylvania
Rose, Charles H., M.D., '64
Maryland
Rosenstein, Simon, M.D., '71
Pennsylvania

Rosman, John, M.D., '69
New York
Ross, D. K.(D) '66, '68, '69
New Jersey
Ross, J. M. '64
Pennsylvania
Rothlack, A. B. '68, '69
Pennsylvania
Rothrack, Isaac, M.D., '64
Pennsylvania
Routh, H. L., M.D., '69
Texas
Rowland, J. S. '59
North Carolina
Rowley, E. F. S., M.D., '69
South Carolina
Rownsevell, A. P., M.D., '71
New York
Rubio, Basilio E. '74
Brooklyn
Ruggles, Silas, M.D., '63
Massachusetts
Russell, A. '66
West Virginia
Russell, D.(E) A. '62
Pennsylvania
Ryan, Charles, M.D., '71
Philadelphia

Sage, Samuel '60
Michigan
St. Clair, Isaac, M.D., '69
Pennsylvania
Salisbury, Elliott E., M.D., '67
New York
Satterthwait, I. C. '66
New Jersey
Saylor, H. M. '66, '68, '69
Pennsylvania
Sayres, C. C. '64
Ohio
Sayres, Konn B, M.D., '64
Ohio
Schumann, S. F.(T), M. D., '69
Maryland
Seachman, George W., M.D., '66
Pennsylvania
Seely, H. C. '67, '68, '69
Indiana
Sharkey, William P., M.D., '65
Pennsylvania
Sharp, William Henry '66, '67, '68, '69
Philadelphia
Sharpless, B. Frantz, M.D., '63
Pennsylvania
Shaw, W. W., M.D., '63
Pennsylvania
Shaw, W. W. '66
Pennsylvania
Shelby, M. '67, '68, '69
Alabama
Sheppard, F. N.(U), M.D., '65
Pennsylvania
Sherman, Arthur N., M.D., '75
Green Point, Long Island, New York
Animal Mesmerism, from original observation.
Shivers, Samuel G. '66, '67, '68, '69
New Jersey
Shoemaker, M. K. '68, '69
Kansas
Short, R. Newton, M.D., '67
Pennsylvania
Shreve, Joseph, M.D., '66
New Jersey
Shreve, Joseph '67, '68, '69
New Jersey
Shuler, Joseph S. '67, '68, '69
North Carolina (South Carolina)
Simmons, A. M. '67, '68, '69
New York (North Carolina)
Simmons, Peter, M.D., '65
New York
Simms, E. F.(T), M.D., '69
Alabama
Simpson, John J. '65, '66, '68, '69
Pennsylvania
Sitherwood, George D., M.D., '69
Ohio
Sitherwood, George D. '66, '67
Pennsylvania
Slaven, Henry B. '68, '69
Ontario
S(l)outher, James M. '63
Pennsylvania
Smead, W. '67, '68, '69
New York
Smedley, William '65
Pennsylvania
Smith, Byron A. '66
Pennsylvania
Smith, C. T.(F) '65, '66
Pennsylvania
(Washington, D. C.)
Smith, Franklin B.(D), M.D., '69
Michigan
Smith, Francis M. '67, '68, '69
New York
Smith, Frederick D. '67, '68, '69
New York
Smith, John '60
Iowa
Smith, J. B. '66
Delaware
Smith, John D. '59, '60, '61, '62, '63
Pennsylvania

Smith, J. D. '69
Philadelphia
Smith, Julian G. '68, '69
Bermuda
Smith, J. G. '68, '69
Alabama
Smith, J. K., M.D., '69
Pennsylvania
Smith, S. C., M.D., '71
New York
Smith, Samuel D. '59, '61
Delaware
Smith, Stephen F., M.D., '69
New York
Smith, T. B., M.D., '68
Michigan
Smith, William B. '62, '63
Pennsylvania
Smith, William H. '68, '69
North Carolina
Smith, William H. '59
Delaware
Snyder, (J. I. B.; G. J. B.; G. I. B.), M.D., '69 *ad eundem*
Ohio
Southwork(th), Oscar L., M.D., '66
New York
Spaulding, A. M. '68, '69
Alabama
Spaulding, D. L. '64
New York
Spear, M. L. '60
Michigan
Speicher, D. J. '61
Pennsylvania
Spencer, C. A. '68, '69
Pennsylvania
Spencer, H. H. '64
Canada West
Spring, John V., M.D., '69
Mississippi
Sprogle, Samuel H., M.D., '64
Pennsylvania
Sprogle, Samuel H., (M.D.), '63
Pennsylvania
Stamm, Martin, M.D., '71
Switzerland, Ohio
Standish, William H. '64
New York
Stanger, Levi (S.) P., M.D., '61
New Jersey (Pennsylvania)
Stanton, James H. '69
Philadelphia
Stebbins, Loring C., Honorary M.D., '71
Ohio
Steelman, John '62
Delaware
Steer(e),* William B., M.D., '62
Indiana
Ste(i)nhouse, James '67, '68, '69
Canada West
Stetson, L. M. '60
Massachusetts
Stevens, George '74
Chicago
Stevens, John '64
Pennsylvania
Stevens, J., (M.D.), '63
Pennsylvania
Stevens, J. A., '68, '69
France
Stevens, John L., M.D., '62
England
Stevenson, James '68, '69
Canada West
Steward, George '66, '68, '69
Philadelphia
Stewart, Chauncey, M.D., '61
Ohio
Stewart, Jehiel W., M.D., '69 *ad eundem*
Michigan
Stewart, J. Worthington '69
Michigan
Stiles, George M. '64
New Jersey
Stiles, James E., M.D., '65
Pennsylvania
Stiles, Oliver D., M.D., '65
Pennsylvania
Stolz,* J., M.D., '65
Ohio
Stoner, William Bruce, M.D., '66
Pennsylvania (Maryland)
Strat(f)ford, H. K., M.D., '65
Illinois
Stratton, Albert G., M.D., '69
Philadelphia
Stuard, Edward S., M.D., '65
Pennsylvania
Stuart, T. H. D., M.D., '69
Louisiana
Sturdivant, Thomas '60, '61
Pennsylvania
Sturgis, George E., M.D., '62
Maine
Sturgis, George E. '66
New York
Sullivan, James G. '74
Whaleyville, Maryland
Summers, Henry A., M.D., '65
Canada West
Surface, Cornelius, M.D., '61
Ohio
Swag(y)er, G. N. W., M.D., '69
Michigan
Symes, J. S. '62
Delaware

Tarbell, D. H. '66, '68, '69
New York
Tate, F. M., M.D., '69
Iowa
Taylor,* Alonzo C.(Z), M.D., '65
New York
Taylor, James W. '62, '66
Pennsylvania
Taylor, Norton J., M.D., '65
Ohio
Taylor, Pardon F., M.D., '66
Michigan
Taylor, William, M.D., '61, '61
Pennsylvania
Taylor, William, M.D., '67
Pennsylvania
Terry, A. J. '66
Pennsylvania
Terry, Isaac Chauncy, M.D., '69
Philadelphia
Terry, M. F., M.D., '64
Pennsylvania
Thayer, Eli, Jr., M.D., '66
Massachusetts
Thayer, Ira A. '62
Ohio
Thickstan, D. H. '60
New Jersey
Thomas, I. C., M.D., '71
Pennsylvania
Thomas, John L., M.D., '60
Pennsylvania
Thomas, J. S., M.D., '71 *ad eundem*
Alabama
Thomas, Walter '63
England
Thompson, Charles '60
Vermont
Thorn, H. P. '60
Ohio
Thornton, George D. '61
Ohio
Thorp, C. K. '68, '69
Kentucky
Tobin, Charles, M.D., '63
Connecticut
Tomlinson, John J.(W., M.D., '69
North Carolina (South Carolina)
Torrey, Joseph '69
Philadelphia
Torry, I. T. '67, '68, '69
Illinois
Town, E. '62, '64
Pennsylvania
Town, Edwin, C., M.D., '71
Philadelphia
Townsend, G. '60
Pennsylvania
Townsend, George D. '59
Pennsylvania
Townsend, George D., M.D., '61
Rhode Island
Trickett, William '64
Pennsylvania
Tucker, Charles A.(B), M.D., '65
Massachusetts
Tucker, H. A., M.D., '65
Massachusetts
Tucker, R. B. '68, '69
Tennessee
Tusting, Robert '60, '61
Pennsylvania
Tusting, Robert, M.D., '62
England
Tuttle, M. C.(E), M.D., '63
Massachusetts

Underwood, William '62
Ohio
Urquhart, David C., M.D., '60, '63
Pennsylvania

Van Marter, John S., M.D., '66
New Jersey
Vanmeter, A. '65
Missouri
Vannaten,* R. (B. E.), M.D., '63
Pennsylvania
Vantrump, L. '60
Ohio
Van Volkingburg(h) (Valkenburgh),* J., M.D., '62
New York (New Jersey)
Van Vranken, G. D., M.D., '69
New York
Vast, Petrum Franciscum, M.D., '71
New Jersey
Vigil, Victoriano Mata '74
Cuba
Viney, William L. '62
Massachusetts
Vinton, J. D., M.D., '64
Massachusetts
Von Cavania, D. B., M.D., '66
England

Wade, Hamilton, M.D., '69
Missouri (Maryland)
Wade, John W., Jr. '74
Millville, New Jersey
Walker, C. F. '68, '69
North Carolina
Walker, Henry F., M.D., '69
Georgia
Walla(i)han, Sam S., M.D., '65
Wisconsin

Waltman, William, M.D., '64
Pennsylvania
Warren, Guy, M.D., '69
Ohio
Washburne, Nelson M., M.D., '69
Illinois
Waters, T.(J) P., M.D., '64
Canada West
Waters, T. P., M.D., '65
Delaware
Waters, T. P., M.D., '67
New Jersey
Watson, Henry, M.D., '60, '60
Ohio
Watts, H. M., M.D., '67
Maine
Weaver,* Rufus B., M.D., ('65, '66)
Pennsylvania
Weaver, Rufus B., M.D., '69
Philadelphia
Wehr,* Solomon F., M.D., '62
Pennsylvania
Wehr, J. S. '62
Maine
Wells, I. C. '63
Massachusetts
West, James D., M.D., '65
Maryland
Westcott, James L. '67, '68, '69
Philadelphia
Weston, A. G., M.D., '63
New Hampshire
Wheeler, John D., M.D., '65
New York
Whisler, Simon M.(H), M.D., '64
Pennsylvania
Whitcher, Theodore D., M.D., '69
Canada West
White, D. M., M.D., '69
Georgia
White, H. B. '66, '68, '69
Pennsylvania
Wiggins, E. S. '66, '68, '69
Ontario
Wilber, John H., M.D., '64
New York
Wilbu(e)r, H. Prescott '61
Massachusetts
Wilcox, M., M.D., '66
Pennsylvania
Wilder, Charles, M.D., '62
Illinois
Wiles. W., M.D., '69 *ad eundem*
New York
Wilford, J. B., M.D., '66
New York
Wilkin, Walter George, Honorary M.D., '71
New York
Wilkinson, J. M., M.D., '69
Ontario
Willey, B. F., M.D., '65
Michigan
Williams, Cornelius, M.D., '69
Minnesota
Williams, J., M.D., '63
Pennsylvania
Williamson, Charles M., M.D., '71
Pennsylvania
Wilson, G. W. S., M.D., '67
Pennsylvania
Wilson, Darius '74
Louisville, Kentucky
Wilson, Richard T. '74
Philadelphia
Witherspoon, J. H. '63
Pennsylvania
Wolfe, Charles L., M.D., '63
Pennsylvania
Wolff (Wolfe),* N. B., M.D., '61
Massachusetts
Wood, George W., M.D., '65
Canada West
Wood, W. H. '74
Philadelphia
Woodard, T. M. '60
Maine
Woodfalk, James H. '59
Alabama
Woodward, W. W. '59
New Hampshire
Worthington, Thomas '59
Tennessee
Wright, George, M.D., '67
New Jersey
Wright, L. B., M.D., '69
Ohio
Wright, Robert S. '59
California
Wright, Willard, M.D., '64
New Jersey
Wychoff, W. W., M.D., ('67, '64)
New Jersey
Wyette, Alexander R. '63
Philadelphia

Young, Guilford '68, '69
North Carolina
Young,* John D., M.D., '65
Massachusetts
Young, Wesley '59
New York
Younghusband, Lancelot, M.D., '69
Michigan

Zender, Reverend P. D. L., M.D., (M.D.), '63
Philadelphia

Zerman, Francis, M.D., '69
Philadelphia

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The Medical Society in America: Past and Present[1]

By THOMAS M. DURANT, M.D.

"Not forsaking the assembling of ourselves together." (Hebrews *10:* 25)

IT IS with some feeling of nostalgia that I come before you for the third and last time as your president. Although this is a day for State of the Nation Speeches, as the Washington broadcasts remind us, I am not going to spend time here in giving such a talk. I could, to be sure, remind you that we, like our nation, have a financial deficit, but I trust that with us this is a temporary state, and I will not dwell on it, important as this matter may be. Instead, I propose to develop for you a brief historical picture of medical societies in America and attempt to ascertain from it present day trends and lessons for the future, particularly with respect to our own institution, which has played, and continues to play, such an important role in American Medicine. Toward this end, I have summarized on two slides with the splendid aid of Dr. McDaniel, Mr. Morse and many books and periodicals, the major pertinent events, first prior to 1800 (Fig. 1) and then after that date (Fig. 2). Included are references to outstanding libraries since these are such important by-products, in many instances, of societies, and some of the earliest of our American Medical Colleges which have persisted to the present and co-operated with the societies in the total medical educational effort.

You will note that I have headed this list with two English Societies and a French Library. The former have been included because their influence in America has been so great. The Royal College of Physicians, established in 1518 by a decree of Henry VIII at the urging of the great Thomas Linacre, has undoubtedly served as the inspiration and pattern for many of our societies both in our early years and more recently. It was Heinrich Stern's profound impression of the distinction and dignity of this English organization, for example, that led him in 1915 to initiate the founding of the American College of Physicians. I am sure also that the founders of our own College of Physicians' in 1787, much earlier had thoughts of emulating it, though there are no documents giving direct evidence of this.

The Royal Society of London, founded in 1645, is noted in this survey because of its world-renowned *Philosophical Transactions*. It published the important writings of Leeuwenhoek, Malpighi and other scientific giants of those days. Following this early example, the publications of transactions by Medical Societies has been of the utmost value in disseminating to physicians and scientists new discoveries and developments. I have found

[1] Annual Report of the President, The College of Physicians of Philadelphia, 8 January 1964.

Year	*Society*	*Libraries*	*Medical School*	*Year*
1518	ROYAL COLLEGE OF PHYSICIANS (London)	Library—1525		
1645	ROYAL SOCIETY (London)	Library—1667		
1733		Library of PARIS MEDICAL FACULTY		
1735	Boston			
1755	Charleston, S. C.			
1762		Library of THE PENNSYLVANIA HOSPITAL		
1765	Weymouth, Mass. (Rural)		UNIVERSITY OF PENNSYLVANIA SCHOOL OF MEDICINE	1765
1766	NEW JERSEY MEDICAL SOCIETY*			
1766	Philadelphia—AMERICAN PHILOSOPHICAL SOCIETY			
1767	Litchfield, Conn.		KING'S COLLEGE (Columbia, 1792)	1767
1767	New York			
1780	Boston			
1781	MASSACHUSETTS MEDICAL SOCIETY*			
1782	ROYAL SOCIETY OF EDINBURGH		HARVARD MEDICAL SCHOOL	1782
1784	New Haven County, Conn.			
1784	ROYAL COLLEGE OF SURGEONS (Ireland)			
1787	*COLLEGE OF PHYSICIANS OF PHILADELPHIA**			
1788		Library of THE COLLEGE OF PHYSICIANS OF PHILADELPHIA		
1789	MEDICAL & CHIRURGICAL FACULTY OF MARYLAND			
1798			DARTMOUTH MEDICAL SCHOOL	1798

* AMERICAN SOCIETIES PUBLISHING TRANSACTIONS.

FIG. 1

our own *Transactions & Studies* a very important part of my library and it is my hope that these issues will be made of increased usefulness to all of our members by publication of a cumulative index at five year intervals. Consider, for example, the importance of being able to find easily the paper by Willis Potts on The Story of Heart Surgery, that by Macfarlane Burnet on Immunological Specificity, or that by John Eager Howard on the Parathyroid Glands. Each of these is an example of Medicine on the March.

Turning for the moment to Libraries, that of the Paris Medical Faculty, founded in 1733, is included because of its early fame and example for the medical world, and also because it presents a sad example of what War's destructive results can be. Prior to World War II this was the world's largest medical Library, with the possible exception of some in Russia whose claims are hard to evaluate. It had 504,000 volumes then, but in the latest listings is well down the list, having lost in total volumes to 490,000 while most others have gained appreciably. There may be other reasons for this, of course, but it is very tempting to consider War and the German Occupation as major causes. In our own country, the first medical library historically was founded here in Philadelphia 29 years after the French library

Year	*Society*	*Libraries*	*Medical School*	*Year*
1800	ROYAL COLLEGE OF SURGEONS (ENGLAND)			
1809			YALE MEDICAL SCHOOL	1809
1819		Library of HARVARD MEDICAL SCHOOL		
1825			JEFFERSON MEDICAL COLLEGE	1825
1837	American Physiological Society			
1839	Philadelphia Pathological Society			
1844	Association of Medical Superintendents of American Institutions for the Insane—AMERICAN PSYCHIATRIC ASSOCIATION			
1846		Library of THE NEW YORK ACADEMY OF MEDICINE		
1847	AMERICAN MEDICAL ASSOCIATION			
1848	PENNSYLVANIA STATE MEDICAL SOCIETY		HAHNEMANN MEDICAL COLLEGE	1848
1849	PHILADELPHIA COUNTY MEDICAL SOCIETY			
1850			WOMAN'S MEDICAL COLLEGE	1850
1865		SURGEON GENERAL'S LIBRARY		
1875		BOSTON MEDICAL LIBRARY		
1880	AMERICAN SURGICAL ASSOCIATION			
1886	ASSOCIATION OF AMERICAN PHYSICIANS			
1887	** *CENTENNIAL OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA*			
1901			TEMPLE UNIVERSITY SCHOOL OF MEDICINE	1901
1909	AMERICAN SOCIETY FOR CLINICAL INVESTIGATION			
1913	AMERICAN COLLEGE OF SURGEONS			
1915	AMERICAN COLLEGE OF PHYSICIANS			
1941	AMERICAN FEDERATION FOR CLINICAL RESEARCH			

FIG. 2

as a part of the Pennsylvania Hospital, recognized by most to be our first American Hospital. This antedated by 26 years the establishment of our College of Physicians Library, about which I will have more to say later, by 57 years that of the Harvard Medical School, and by 84 years that of the New York Academy of Medicine.

The practice of Medicine in the American Colonies during the 18th Century was, in general, of poor quality. The mountebank flourished, and, as his Italian-origin name implies, did "mount-a-bench" and sell countless worthless nostrums to a gullible public. In 1753 the medical situation in New York was described as follows: "That place boasts the

honor of about forty gentlemen of the faculty, and far the greatest part of them are mere pretenders to a profession of which they are entirely ignorant". One physician of note in Boston was described as "always positive and sometimes accurate". There were, of course, no effective laws regulating the practice of medicine, and education was almost entirely preceptorial in method.

There were some ambitious young Americans in those days who were dissatisfied with the prevailing situation and travelled to Europe to receive the type of medical education provided by the progressive schools there. Edinburgh's College had an outstanding reputation, and, in the 30 years between 1758 and 1788, 63 of our young men trained there. Included in this group were 3 famous Philadelphians: William Shippen, Jr., Benjamin Rush and John Morgan, later charter members of this College. Portraits of Rush and Morgan are behind me to your right and of Shippen to your left. Dr. Morgan was the founder and first Professor of the Theory and Practice of Medicine at the College of Philadelphia. Founded in 1765, it was the first medical school in the American Colonies and, eventually, became the Medical School of the University of Pennsylvania. Thus Morgan was the first to occupy the Chair now held by our new Vice-President, Dr. Francis C. Wood. It is interesting to note that 19 years after the founding of this School, a Philadelphian travelling in London, Dr. John Rodgers, wrote home as follows: "I am somewhat disappointed in my high-raised expectations of [London's] medical perfections. I am persuaded that medicine is taught more scientifically in Philadelphia than in London, and that our teachers are more attentive to the improvement of their pupils than they are here". This is the earliest testimonial I know to the excellence of Philadelphia medical education and bespeaks a reputation that has been well maintained in the 180 succeeding years.

Three other medical schools founded during the 18th Century have continued to the present. King's College in New York was founded in 1767, two years after the College of Philadelphia, and was incorporated as the medical school of Columbia University in 1792. Harvard Medical School was third on the list, having been founded in 1782. Dartmouth, sometimes known in those days as the "Wilderness School", had its inception toward the close of the century in 1798. Yale's origin dates back to 1809, and our second Philadelphia school, Jefferson, to 1825.

We see thus the beginning of displacement of the preceptorial system by medical school education. Prior to this there had been very limited means for the dissemination of medical knowledge, and the exchange of ideas and experiences. The need for medical societies to serve this purpose was recognized by a few, however, during the middle of the 18th Century and there were abortive attempts here and there, indicated by small type on the slide (Fig. 1) to establish these groups. The first on record is one in Boston which met from 1735 to 1744. Next, as far as we know today, came a Charleston, S. C., society. It purported to be interested mainly in financial matters, especially the fees of physicians, and, after arousing a furor about this in the local papers, apparently ceased to exist. The third was a society in Weymouth, Mass., which is of interest since this was, in those days, an entirely rural area. Again its survival was brief, as were still others to follow. It must be recalled, anent these failures, that this was at the time of the French and Indian War, and the threat of Indian attack may have made it more dangerous to ride horseback or walk to a meeting then, than to drive the expressway to this meeting tonight. Furthermore, I feel certain that our pioneering medical forefathers were even more ruggedly individualistic than are today's physicians, and this can create problems at times.

The first society to survive from its origin to the present is the New Jersey Medical Society, now The Medical Society of New Jersey. This came into being at a meeting in New Brunswick in 1766, attended by representatives from all parts of the colony. Its

meetings were interrupted during the Revolution, but it has otherwise survived all obstacles and is therefore the oldest state medical society in the United States today. It is particularly interesting to note that this society in its early days (1772) succeeded in getting through the legislature the first act to regulate the practice of medicine in this country.

The Massachusetts Medical Society, founded in 1781, is the second medical group in this country to maintain continuous existence to the present and the first with a record of uninterrupted meetings. This state society, together with the New Jersey forerunner, did not become a part of the national society until more than a half century later, when the American Medical Association was organized.

Our own College had its first meeting, of which there is a record, in Philadelphia on a January evening 177 years ago (1787), four months before the Federal Constitutional Convention met in Independence Hall. Dr. John Redman, whose portrait is behind me to your left, presided. It became, thus, the first permanent non-state medical society in the United States. It was, furthermore, the third organization to publish transactions, and it soon established a library with an initial investment of approximately $130, expended by a Library Committee consisting of Drs. John Jones, Thomas Parke and the famous Caspar Wistar. The earliest city directory published (1785) showed that there were 46 physicians then in Philadelphia, a town with a population of about 40,000. The Senior Charter Fellows of the College were 12 in number, and the Junior Fellows 13. This initial group established traditions and objectives of service to mankind which have been well maintained by subsequent generations.

Six years following the birth of the College, in 1793, Philadelphia was stricken with the worst epidemic in its history—prior to the 1918 influenza pandemic. In the summer of 1793, yellow fever took the lives of approximately one-tenth of the population. More would have died, no doubt, had not so many fled the city to safer regions, including President Washington, who spent that summer in Germantown. The members of the medical profession, however, remained true to their pledge of duty, and some paid the supreme penalty, including James Hutchinson, first secretary of the College, whose portrait is seen to the right of the center aisle. During this epidemic the College served as a public health department for the city since such an official department did not then exist. It was in the following year that Philadelphia, realizing the necessity for such service, established the first Board of Health in the United States. We have thus mentioned two functions in which medical societies were originally interested and involved which became governmental functions, those of regulating medical practice, and the public health function.

After 1800

The beginning of the 19th Century is marked, from the standpoint of Medical Society history, by the founding of the Royal College of Surgeons of London in 1800. This was not the first such society in the British Isles since the Royal College of Surgeons of Ireland had been established 16 years earlier, and most certainly far from first as compared with the European Continent.

During the 18th Century, France had been the surgical center of gravity and the Paris *Académie de Chirurgie* had been a prominent organization since 1731. In the 19th Century, however, the center of gravity shifted from Paris to London and the founding of the Royal College there is what might be expected with the almost simultaneous development within the British Isles of such a galaxy of famous surgeons as John Bell, Astley Cooper, Benjamin Travers, Abraham Colles, James Syme, Benjamin Brodie and many others.

In our own country, surgery developed rapidly during the 19th century. Members of our College contributed mightily to this advance, notably Samuel D. and Samuel W. Gross, W. W. Keen, Howard A. Kelly, and John B. Deaver. I think it is interesting, however, that the first large surgical society, the

American Surgical Association, was not founded until 1880, and the American College of Surgeons awaited the tremendous efforts of Franklin H. Martin to achieve its birth in 1913.

It is also hard to believe that our Country had no national organization to embrace in its membership all reputable physicians until 1847 when the American Medical Association was founded in our own city. There were not many state societies prior to this year either but, within 12 months thereafter, 3 such bodies came into being, including the Pennsylvania Medical Society, and five others became reinvigorated. New county societies were also formed, in turn, and our own Philadelphia County Medical Society held its first meeting on January 16, 1849. Dr. Alfred Stillé, Professor of Medicine at the University of Pennsylvania, and president at various times of both the County Society and the College of Physicians, said of the birth of the county society that, "Its father was the American Medical Association, its mother the Pennsylvania State Medical Society".

Another trend that became apparent during the century, with the rapid advance of the frontiers of medical knowledge, was the development of specialty groups. Relatively early in the century two basic science societies made their appearance, the American Physiological Society in 1837 and the Philadelphia Pathological Society in 1839, each surviving only a few years, but each reestablished later. The management of mental disease in those days was largely a matter of institutional care, and the original title of our present American Psychiatric Association was Association of Medical Superintendants of Institutions for the Insane, a society founded in 1844.

It was not until after the Civil War that the real flowering of specialized societies occurred. In the field of Internal Medicine, the founding of the Association of American Physicians in 1886 was a notable event since at its meetings many of the greatest developments in the advance of medicine were first heard by a national audience, including Fitz on appendicitis, Minot and Murphy on pernicious anemia, Swingle and Pfiffner on Addison's Disease, and many others. Dr. S. Weir Mitchell of Philadelphia was the second President of this Association.

The limited membership of the AAP led in 1909 to the founding of the American Society for Clinical Investigation ("Young Turks") as a forum for young investigators unable to achieve membership in the blue ribbon society. (The nickname, "Young Turks," came from the vigorous activity at that time of Ataturk and his followers in the westernization of Turkey.) Later, the ASCI also became a limited membership group, and in 1941 Dr. Henry A. Christian stimulated the organization of the American Federation for Clinical Research, sometimes facetiously called the "Young Men's Christian Association" or the "Christian Scientists". This society has maintained a democratic constitution, now has a membership of over 4,000 and completely fills the Steel Pier theater each year at its annual meetings. Such is the present status of interest in clinical research.

The American College of Physicians, founded in 1915, has much the same objectives in Internal Medicine as the American College of Surgeons in Surgery. Fellowship in each of these organizations is achieved only by the fulfillment of rigid criteria of excellence in the respective field. Annual meetings of the ACP and ACS provide a wide range of presentations covering basic science, clinical investigation and clinical practice.

A great deal more could be said concerning specialized societies, but time permits only the note that a sufficiently interested, time-free and financially independent individual could spend the entire year going from one meeting of such organizations to another. During May last year, 31 national specialty societies held meetings in various cities of the United States!

A brief comment concerning medical libraries since 1800 should be made at this time. The number and size of these collections has increased markedly in the medical centers of the

United States and I have included a few of the larger areas on the slide. The Army Surgeon General's Library consisted of only 1,000 volumes when John Shaw Billings became its librarian in 1865. Through his energy, perseverance and ability, and Uncle Sam's ample purse, it became the best medical library in the world, today housing over a million volumes. Our own College of Physicians library has grown from 38,000 volumes in 1887, when Weir Mitchell was president, to 176,000 in 1943 and 223,656 twenty years later in 1963, not to mention 321,466 pamphlets and theses. It ranks among the five largest in our country.

On the slide (Fig. 2) I have referred to the Centennial in 1887 of the College of Physicians of Philadelphia because the transactions published that year include a magnificent history of our society by Ruschenberger along with other papers of great interest. A perusal of this volume will reward anyone who is interested, not only in the history of the College, but of Medicine in America as well, since early American Medicine was, to a considerable extent, Philadelphia Medicine.

The Future

What of the future of American Medical Societies and particularly our own? Of the many functions performed by organized medical groups in the past, what are the ones most needed today, and which can we, in our particular setting, perform best? With many of them we need not concern ourselves at all. The regulation of medical practice has been taken over quite adequately by physician boards of government at the M.D. level, and, partially, by specialized societies and certifying Boards at the post-graduate stratum. Likewise, governmental agencies now have good control over problems of public health, again through proper employment of physicians. Research support has been a society function to a limited extent in the past, but today the National Institutes of Health have taken over the lion's share of this support both from the societies and from private agencies. On the whole this has been wisely and fairly regulated, though some have great fears of dominating and stifling paternalism in the future. The fear of excessive governmental control in this and other spheres of professional activity together with a rapid change in the milieu in which the physician practises have led, of necessity, to a growing interest in political and socio-economic problems. The American Medical Association and its component societies have taken over most of these functions, albeit in an ultra-conservative fashion, but, on the whole, quite adequately.

Let us turn, then, to our own potential. The College, as already emphasized, has, first of all, one of the finest medical libraries in the world. With the tremendous expansion in medical literature today, we must be able to keep up in the future, not only with this expansion, but also with newer means as they are developed for cataloguing, collating and making readily available to physicians and other investigators the latest information in a particular field. This is a gigantic assignment. In the 18th Century there were 10 scientific journals. Now there are nearly 50,000 in all fields! Our library has a subscription list of 1,476, which covers a great majority of the journals important to us as physicians. Illustrative of the difficulty in finding time to keep up with the literature, there are presently being published about 300 abstract journals in the various scientific fields. Now there are even a few periodicals that abstract the abstract journals!

If we were to chart the total knowledge in natural science and social science fields from the birth of Christ to the present, this knowledge roughly doubled up to 1750, doubled again from 1750 to 1900, again from 1900 to 1950, and again from 1950 to 1960! This steeply-rising curve is a staggering one, and one that is going to require the best in electronic equipment in order to provide adequate retrieval of pertinent information as needed. Toward this end the College has been, and continues to be, actively seeking governmental support along with other large medical libraries in the east. Activity of this sort requires

patience and persistent knocking on Washington doors, and eventually only an Act of Congress will enable us to reach our objective. Meanwhile we are moving toward greater cooperation with the medical schools of Philadelphia in that a Committee made up of representatives of the College, the medical school and college librarians and the Deans, has been appointed to work toward the greatest possible progress through cooperation. I look for this to be a very productive committee.

We have another potential which should be developed fully. Our College is somewhat unique among the medical societies of our day of specialization in that the Fellows are a selected group consisting of the better physicians from all fields of medical endeavor—general practice, internal medicine, surgery and all other specialties. Do we not then possess a golden opportunity to act as a *centripetal* influence in opposition to the *centrifugal* forces driving the various groups farther and farther from each other, and each group, in turn, into further fragmentation? Do we not all have as a common objective the health and happiness of our fellow man, and does this not necessitate a greater exchange of ideas and viewpoints than now exists? I find great hope in noting that a unifying force has arisen amongst the basic science medical specialists—the new science of molecular biology—which is bringing into a brotherhood with common language the physiological chemist, the microbiologist, the physiologist, the geneticist, and the pharmacologist. True, this same force has widened temporarily the chasm between the basic scientist and the clinician since we bedside physicians find it more and more difficult to understand their new language. But I have used the word "temporarily" since I am sure that sometime in the future a fresh unifying force will develop to bridge this chasm also.

In the clinical fields we can see manifestations already of a breakdown of departmental walls, and early evidence of new bridgeheads being established even to the basic sciences. Take, for example, the remarkable unity that has arisen between the cardiologist, the pediatric cardiologist, the thoracic surgeon, the physiologist and electronics engineer. I could give many other examples of this sort of cooperation, but there is one unifying effort in which our College is pioneering and of which you should be aware. This past year we have established under our aegis a committee of an entirely unique type, made up of representatives of the Philadelphia medical schools and colleges of pharmacy and the leading Philadelphia area pharmaceutical firms. This committee is actively engaged in an attack on the problems of drug testing and the establishment of drug safety. A remarkable spirit of unity and idealism pervades this committee's deliberation and I am sure the results will be of great magnitude. No doubt the example established by the College in this venture will be copied elsewhere. Does this not well illustrate my point—"out of many, ONE", and can we not find other avenues of approach to the unity problem? Dr. Iago Galdston has aptly said, "The long view of the history of science reveals the pattern of periodic diversifications in interest and knowledge, that is specialization, followed by periods wherein the synthetic unification of knowledge is achieved. Science is never more innately constant and rewarding than during its unitary stages." Let us make this striving toward unity one of our goals for the future!

In conclusion, I would like to say that no President can serve the College adequately without the aid of a large number of persons. My most heartfelt thanks are due to Miss Lang, Miss Fritz, Mr. Morse and Dr. McDaniel and their library staff, Mr. George Allen and his staff, and last, but by no means least, my fellow officers, Dr. John Gibbon, Jr., Dr. William Steiger and Dr. Kenneth Elsom, to our editor of the *Transactions & Studies*, Dr. Fred Rogers, and to all of the Council and Committee members who have served so loyally and so faithfully. I have every confidence that our College will carry on, and further advance the traditions and objectives established by "the great cloud of witnesses" whose portraits look down upon us from the walls of Mitchell Hall.

Ballistocardiography and Vectorcardiography: Similarity and Difference[1]

By PROF. H. C. BURGER, D.SC.[2]

IT IS a great honour for me to be given the privilege of delivering the famous Hatfield lecture, given by so many illustrious scientists before me. I will discuss some characteristic points of similarity and of difference of two methods of cardiological research, ballistocardiography (BCG) and vectorcardiography (VCG). But first of all I must apologize that my language is not yours. I mean this in a double sense. Firstly, English is not my native tongue and you will recognize this in my pronunciation, my choice of words, and my construction of sentences. But secondly, and of more essential importance, I must confess that I am a physicist and as such I am accustomed to use the language of physics and even of mathematics. I hope this confession will not frighten you too much, and to ease your mind I may assure you that I am a *medical* physicist. This means that the object in all my research and teaching is just the same as that of the physician, it is finally focused on the well-being of the patient. It is only my *methods* that differ from yours. In discussing my subject I shall emphasize the relationship of both cardiological methods, BCG and VCG, with physics.

Both are cardiological methods that can contribute to diagnosis; BCG pertains to haemodynamics and VCG is closely related to electrocardiography. So it may be clear that in BCG we need an insight into mechanics, while in studying VCG a knowledge of electricity is required. I shall try to give a brief introduction to both subjects.

A. *Ballistocardiography*

In the middle of the 19th century it was known that the human body, under favourable circumstances, could show periodic movements, connected to the heart beat. In the beginning of the 20th century Henderson gave the study of these movements a more exact form by recording the horizontal movement of a subject lying on a light bed, suspended on long ropes, so that it could move only in the head-footward direction of the subject. It was a happy circumstance for me that my brother, a physician and a physiologist, showed me a copy of the Henderson instrument about forty years ago. The small, but distinct movement of the subject lying on the Henderson swing made a profound impression on me. I developed a simple reasoning to explain the effect and this was the basis of a theoretical standpoint used many years later. I will explain you this now.

We can simplify the mechanical problem by assuming that the external forces acting on the body of the subject are negligible. Then the complicated problem of a body consisting of many parts all acting with mutual forces on one another has one general and simple property: its center of mass (or center of gravity) behaves as if the internal forces do not exist. It has a rectilinear, uniform motion or, in a special case, it may be at rest. This general law of physics introduces a significant simplification in the theory of BCG and replaces intuition by well founded physics. Using the Henderson method the horizontal, longitudinal movement of the subject is only slightly counteracted by the suspension of the bed, so that the neglect of the external forces is acceptable. It is almost as if the subject is floating in space (Fig. 1).

For a long time the reaction effect remained a curiosity until Dr. I. Starr retrieved this phenomenon from the collection of curiosities and made it to a useful clinical method. He explained the effect as a consequence of the

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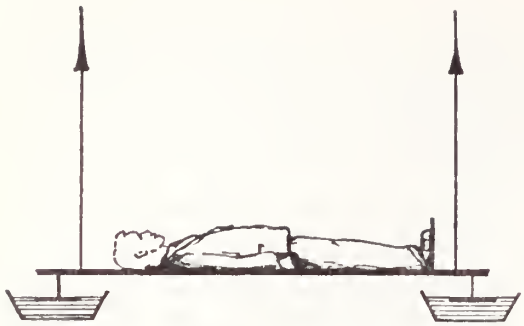

FIG. 1. Patient on BCG swing.

reaction forces generated by the ejection of the blood by the heart and it could be expected that a record of the body's movement would give valuable information concerning the strength of the heart.

There are two approaches to the study of the ballistocardiographic effect, the first reducing the external forces to a minimum (Henderson). In the second, the Starr method, the force exerted by the ejection of the blood by the heart was the purpose of the investigation. Therefore, the subject was put on a table, the latter being bound firmly to the surroundings, and the small displacement of this table, the consequence of the reaction force, was recorded. Later these two methods were indicated as ultra low frequency (ULF) BCG and high frequency (HF) BCG respectively.

These two methods may seem quite different and indeed remained for some time completely independent. But, as we shall see presently, by contact and collaboration of physicians and physicists, it has been possible to unify the two standpoints. I will use this opportunity to thank Dr. Starr for all he has done to promote a fruitful teamwork of physicians and physiologists on one side and physicists on the other.

Among the physicists who contributed essentially to this foundation I shall mention only a few: Drs. Talbot and Von Wittern in this country and my associate Dr. Noordergraaf in Utrecht. They have discussed mathematically the behaviour of the human body, lying on a swing or table. The simplest problem is that of a human body assumed to be one rigid unit and rigidly bound to the bed or table. The latter is supposed to be coupled to the surroundings with a directive force, proportional to the distance from the equilibrium position and by a frictional force proportional to the velocity of the bed or body with respect to the surroundings. This system is driven by the periodic displacement of the center of mass inside the human body. This situation can be realized by a supine patient on a kind of swing, supported on long parallel ropes (ULF) or on a table, connected to the floor by strong springs (HF). Even without the expert knowledge of mechanics and mathematics it must be clear that the body on the swing or table will move to and fro if the center of mass is moving rapidly, but with a very slow movement the body will stay in its equilibrium position. But this is only a vague and qualitative statement. The reaction of the body on any movement of the center of mass can be described by the second order differential equation:

$$m\frac{d^2x}{dt^2} + \beta\frac{dx}{dt} + Dx = m\frac{d^2x_c}{dt^2}.$$

(x = displacement of body + bed, x_c = displacement of center of mass, m = mass of body + bed, β = coefficient of friction, D = restoring force).

The solution of this equation gives the measure of movement of body + bed and its phase lag. All this may sound somewhat mysterious to some of you but I assure you that there is not a superbrain needed to learn the technique of mathematics like this. You all could be trained to use this expedient. But I will not bore you with this method and confine myself to the statement that the solution of the problem can be given by two graphs, denoting the conduct of amplitude and phase of the body-bed system for a purely harmonic or sinusoidal movement of the center of mass. Now an arbitrary periodic movement can be considered as a sum of such purely harmonic contributions, a mathematical theorem due to Fourier. But I fear that again I am carried away by my enthusiasm for the use of the

language of mathematics, so utterly adequate in treating problems like this one. May I add only one remark to the discussion of this simple problem? It combines the two methods of BCG, mentioned before, the ultra low frequency method with the subject almost entirely free to move horizontally and the high frequency method, in which a table is used that is firmly bound to the surroundings. Mathematics has united the two cases which differ only quantitatively. Their names point to the very low natural frequency of the swing when it performs its own free oscillation, after having been displaced and released and the high natural frequency of the Starr table under the same conditions. In figure 2 the result of the calculation is shown as two graphs. They give the ratios of the amplitude of the body and that of the center of mass and of its acceleration respectively, both in the case of a sinusoidal, i.e. a purely harmonic movement of the center of gravity inside the body. On the horizontal axis the frequency is plotted logarithmically, however, not in c.p.s. but as a fraction or multiple of the natural frequency of swing or table. One and the same formula, one and the same graph is valid for both cases. When applied properly, both methods can procure the displacement, velocity, and acceleration of the center of mass inside the body. It is possible to differentiate and integrate any voltage, varying with time by an electronic circuit. Using such a device we can go to and fro in the series of physical quantities: displacement, velocity, acceleration and so both ultra low frequency BCG and high frequency BCG can give all three.

However, there is a practical difference between the two methods. Respiration has a profound effect in the ULF BCG. The curve we obtain from a breathing subject is more a record of his breathing than of his circulatory effect (Fig. 3). There are three ways out to escape from this difficulty, viz., first have the subject, mostly a patient, hold his breath. Although this is quite easily done by a healthy and cooperative subject, this measure is often impracticable when applied to patients. Secondly, apply the high frequency method by which the low frequency harmonics are relatively attenuated. This was the reason why initially the ULF method was rejected and the HF table was introduced. Thirdly, design of an electronic filter cutting out the frequency of the respiration of about 0.3 c.p.s., and lower. This is the most elegant solution but it is not yet realized satisfactorily.

A difficulty of quite a different character, not related to respiration, is the fixation of the bed or the table to the patient. Without special measures, there appears to be a relative movement between patient and bed or table. This

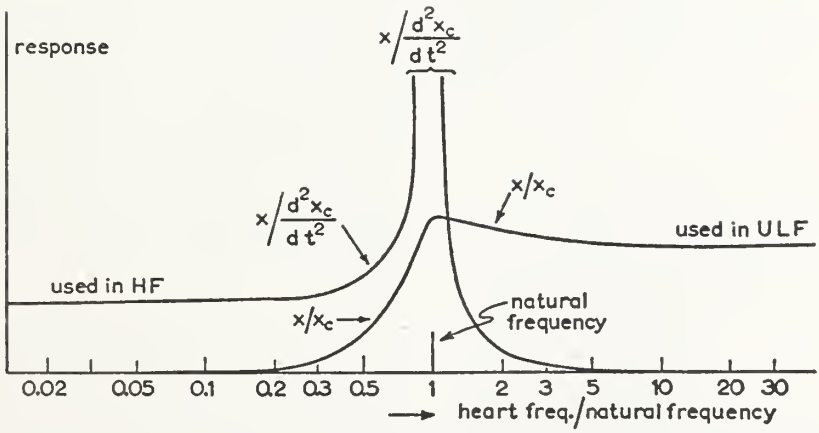

FIG. 2. Amplitude characteristic for ULF and HF BCG, derived from one and the same differential equation.

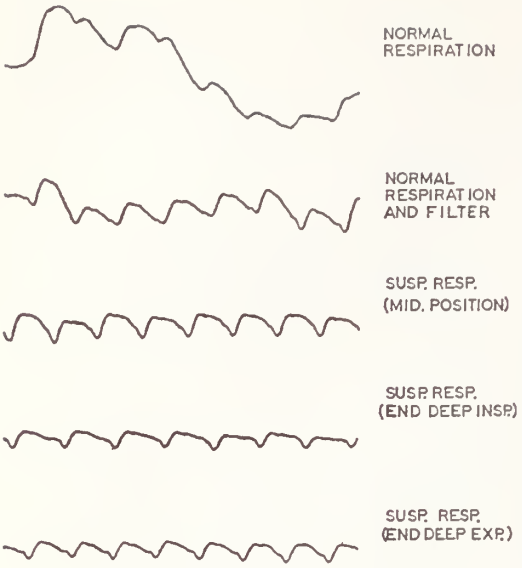

FIG. 3. ULF BCG with and without respiration.

phenomenon has been studied experimentally as well as theoretically among others by my associate Dr. Noordergraaf. If I described the mathematical treatment in some detail I should ask too much of your tolerance. I shall mention only that now not one but two simultaneous differential equations describe the mechanical behaviour of the system. They describe the relative movement of patient and swing or table adequately, so that we may say that we understand what happens in the two-degree-of-freedom system. This understanding of the phenomenon is the key to improvement. By better fixation of the patient, using a footboard and, if necessary other means, the relative movement can be reduced so much, that a satisfactory result is reached. The two methods, ULF and HF give essentially the same result if compared correctly.

Summarizing we can say that the movement of the center of mass, considered as the first, but preliminary, aim of the measurement, can be deduced from the curves obtained by the HF method or by the ULF one. The elucidation of the relation between this movement and the curves has been achieved by the application of rather simple physics and mathematics.

A moment ago I called the internal movement of the center of mass a preliminary aim of ballistocardiographic investigation. And indeed BCG can be of well based physiological or clinical importance only if we understand *why* the center of mass moves. In explaining this to you I shall follow the line of thought as applied by Dr. Noordergraaf in his thesis.

The definition of the center of mass is mathematical and I will not even explain it to you with a formula. The only concept I have to recall is that its position is an average one, depending on the mass distribution. It can be found by an integration over the body. The slight changes in this distribution make the center of mass move. These changes are caused by the circulation. Neglecting other displacement of matter, a certain arterial segment is fluctuating in diameter by the fluctuating arterial pressure and, therefore, the mass of the blood in it is periodically fluctuating.

From the blood pressure curves at different sites of the vascular system and the distensibility of the vessels at these sites the movement of the center of mass can be calculated in a simple way. The difficulty is, however, to know the pressure curves quantitatively, i.e. pressure as a function of time, and the distensibilities all over the vascular system. The phase-differences in the pressure curves, caused by the finite time of propagation of the pulse wave, are of essential importance in this calculation.

Generally, the ballistocardiogram can be seen as an integral of haemodynamic quantities over the body. The heart as a motor and pump is of essential importance, but the vascular system is just as essential.

The simple idea I explained to you gives a fairly true description of the ballistocardiogram, displacement, velocity and acceleration all three.

I may not leave this subject, without mentioning that the body is three dimensional, and, therefore, the movement of the center of mass is a spatial effect; it describes a three dimensional curve. However, the recording of the lateral and the sagittal movement

encounters serious difficulties and therefore, I shall confine myself to the longitudinal effect.

Concluding the discussion of BCG we have seen that physics came too late to unite the two principal methods of recording, the HF and the ULF BCG. It could not prevent the coming into use of a method not based on sound physical principles, but it seems that gradually the application of these principles in BCG is advancing.

Speaking for a medical audience I may not omit the clinical meaning of BCG, how prickly this subject may be for a physicist.

In studying the BCG we must not forget that it reflects the properties of both heart and vessels. I shall not enter into this subject and remark only that the gradual and smooth mechanical heart action gives a rather smooth curve, certainly smooth as compared with an ECG. The maxima are not clearly separated peaks related to separate events, originated by the heart. The BCG is a complicated superposition, in which a kind of mechanical hysteresis caused by the pulse wave in the arteries, confuses the actions of the heart in different phases of the ejection. Even if this ejection were a single peak of very short duration the BCG would show a long drawn oscillation during a second or so.

The amplitude is certainly related to the ejection of blood by the heart and more specially to the stroke volume. Purely qualitatively we may conclude that a small amplitude of the BCG points to a small stroke volume, and, therefore, to an insufficient function of the heart. Without being able to localize its failure, we can draw a conclusion with regard to its strength from the ballisto curve. Dr. Starr has shown us this way and I share his conviction that BCG is an easy and valuable means to judge the ability of the diseased heart.

B. *Vectorcardiography*

The history of VCG begins with Einthoven, founder of ECG in its present form. He introduced the idea of what he called the manifest magnitude of the electrical heart action, called later the heart vector. But it is not names that are essential, but notions. It was Einthoven who considered not the voltages on the body surface alone, but asked what was their origin. He recognized that the electrical heart action is characterized not by an amount only but also by a direction. It is a vector, a quantity with direction and magnitude. There is an analogy of the heart vector and other vectors as force, velocity, field strength, etc. We must consider, however, that the physical character of these quantities is totally different and their similarity is of a more mathematical kind.

In figure 4 you see the way in which Einthoven introduced the vectorial heart action, here displayed by an arrow *H*. In this depiction the situation is simplified and treated as two-dimensional. Einthoven did not think of the vector as pointing out of the plane of the figure. Neglecting the slight asymmetry of the human body, a vertical heart vector would give a totally symmetrical situation in which the equivalence of right and left arm (or shoulder) would give them the same potential. Their potential difference, i.e. lead I, would be zero. A heart vector in another direction would give the greater voltage in lead I the more obliquely it works, or in other words the greater its horizontal component. In the figure this component is denoted by the projection of *H* on a horizontal line, joining right and left shoulder. Thinking further in this line, we need an extension of this method, which can give us leads II, and III. To this end Eint-

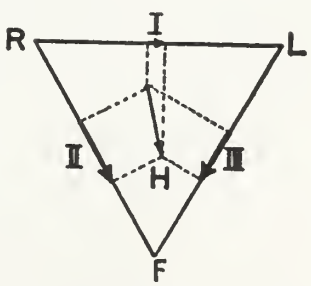

FIG. 4. Einthoven's triangle, giving the leads I, II, III as projections of the heart vector *H* on the sides of an equilateral triangle RLF.

hoven completed the picture with two other lines, forming a triangle with the horizontal one. Their intersection, the lower angular point of the triangle, corresponds to an electrode on the left leg. The originally introduced symmetry compelled him to make the triangle isosceles. A further simplification, although entirely arbitrary, was the choice of an equilateral triangle. On the oblique sides the heart vector was projected to give the leads II and III. This picture, arbitrary as it may be, has persisted to the present time.

But it is not against this arbitrariness and this approximation that I object in the first place. It is the geometrical character of Einthoven's display that lead VCG on a wrong track.

Many cardiologists after Einthoven considered his triangle as absolutely exact and tried to proof this with geometrical arguments. This prevented the development of a sound physical and mathematical basis of VCG. The realization of the three-dimensional character of the human body gave rise to a number of so-called lead systems of VCG in which the components of the heart vector were identified with voltages between electrodes on the surface of the body. Besides on arms and leg electrodes were also proposed and used in different locations on the trunk.

For years lead systems were proposed without any physical foundation, based on intuition and phantasy only. As a matter of fact the loops recorded with these systems for one and the same patient differ appreciably so that a comparison of the results obtained by different investigators, using different systems, is hampered. However, it is very difficult for a clinician, having used a system for years, to abandon it for another one. And so VCG was, and is still, divided and disrupted. I think the main reason for this deplorable situation is, that the introduction of physics came so late.

I shall try to give you an idea of this introduction of physics in which I was involved for a number of years. Long ago, I think in the early thirties, my brother whom I mentioned before, sent me a little book on ECG, in which there was a figure he drew my attention to (Fig. 5). Here the Einthoven triangle was introduced in a drawing of the human body. His question was: how can the length of the arms have anything to do with ECG? Here must be some thing wrong. Can you tell me how this is really?

I did try and from that moment I left the geometrical representation. The real relation between heart vector and leads must follow from an analytical consideration, in its turn based on physical laws. These are the laws valid for an electric current in a three-dimensional body. In figure 6 we see the current lines in the human body, giving in each point the current density, a vector. Related to this vector, in a way not to be formulated here, is the potential, a scalar quantity that has a value, which is function of the position, i.e. of the coordinates inside the body or on its surface.

In books on electric theory we find an equation for the potential which is a partial, linear, second order differential equation. At the boundary of the body no current goes out or in and this gives another equation, again linear. I understand how difficult, mysterious or even distasteful this all is to many of you. But I cannot ignore the essential character of the problem, it *is* physical and mathematical, just as the problem in BCG. The solution cannot be given with simple formulas.

The situation can be simplified somewhat as to the origin of the current field and potential field and this is done in figure 6. The arrow

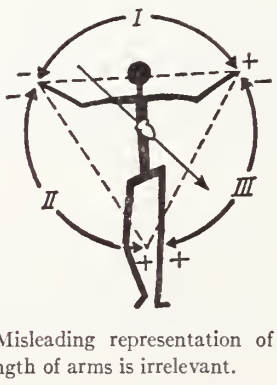

FIG. 5. Misleading representation of Einthoven's triangle. Length of arms is irrelevant.

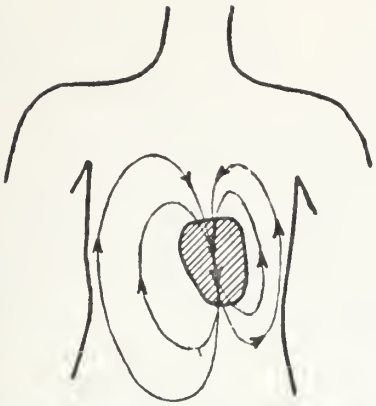

FIG. 6. Current field in the trunk, set up by the electrical heart action.

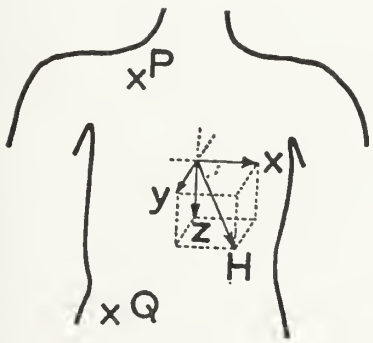

FIG. 7. Orthogonal components X, Y, Z of heart vector H.

is a display of the heart vector, a directional quantity of a kind called dipole by physicists. A popular explanation of its nature can be given by defining it as a quantity giving the amount and the direction of the propagation of electricity, i.e. of ions, by the heart muscle.

The linear character of the equations for the field quantities implies that the relation between the heart vector and leads is linear too. Let the voltage of a lead at a certain moment be V and be X, Y, Z the orthogonal components of the heart vector. These three quantities define the vector, and the reverse. This relation can be seen in the well-known figure 7.

The linear relation between any potential difference V between two fixed points in or on the human body i.e. an electrocardiographic lead, and the three components X, Y, Z of the heart vector is expressed by the equation:

$$V(t) = aX(t) + bY(t) + cZ(t) \qquad (1)$$

In this equation the heart vector and, therefore, its components X, Y, Z vary with time t during each heart beat. The coefficients a, b, c depend on the location of the electrodes, but are constant, hence independent of time. The time variation of X, Y, Z makes V a function of time. This function is an ECG or lead recorded with the electrodes in the relevant positions.

The vector with components X, Y, Z can be represented by an arrow the origin of which is fixed in time while the arrow-head moves according to the time functions $X(t)$, $Y(t)$, $Z(t)$. It describes a three dimensional curve, called vectorcardiogram. This is repeated almost identically in every heart beat. As a rule separate loops, corresponding to P, QRS, and T respectively, can be distinguished.

The equation (1) holds for any body shape and for a homogeneous or heterogenous torso and even when the tissues are anisotropic. The solution of the complicated boundary problem I mentioned a moment ago gives the values of the time-independent coefficients a, b, c. But seldom has one thought of a numerical solution of the boundary problem in the purely mathematical sense. The practical way is to use a model of the human body. This model, filled with an electrolyte and equipped with an artificial heart, like a dipole, can easily give us a, b, c.

It is clear that from the linear equation (1) we cannot calculate the values of the three unknowns X, Y, Z. But we can easily measure three voltages V by applying four electrodes. This gives us three linear equations of the type (1) from which with elementary algebra X, Y, Z can be computed. So physics and mathematics lead us to find the heart vector from three leads.

Two complications must be mentioned. First the human body is heterogeneous. The lungs, containing non-conducting air, are relatively bad conductors, while other parts as muscles

and specially blood are better conductors. In addition the muscles present the difficulty that their conductivity depends on the direction of the current, or rather of the current density (anisotropy). Although reliable data concerning these properties of the body are lacking, it is possible to allow for the first complication, the heterogeneity.

An even more fundamental difficulty is, that the electrical heart action is not localized in one point, but is distributed over a part of the heart muscle. Expressed in a mathematical way we can say that the electrical generator is not a dipole only, but a superposition of a dipole, a quadrupole, etc. Attention is given to this complication and lead systems are devised, specially by American investigators, in which the influence of these higher poles is reduced to some extent. Expressed in other words and not so mathematically: in these systems a number of leads, more than three, are combined in such a way as to give components of the heart vector, more or less independent of the location and distribution of the electrical action inside the heart muscle. It is essential in VCG, that we have to deal with this problem. Experiment shows, that its influence is too great to be neglected. But even with the soundest methods, the heart vector found is not always the same, using different lead systems. In a few subjects the differences are so great that we must confess that the real heart vector or the real VCG is hidden by a veil of physical complications.

Let us now see what VCG is in practice. We need an instrument in which a number of voltages of the leads are combined with the adequate coefficients. The combinations, the components of the heart vector, are fed in pairs in scopes on the screen of each of which a loop, a projection of the VCG, appears. Three projections, frontal, horizontal and sagittal, give more than is necessary to define the vectorcardiogram in space (Fig. 8). An interruption of the electron beam reintroduces the time, that was eliminated in combining X, Y, Z to the spatial curve, the VCG.

There are a number of vectorcardiographs on the market supplied with refinements I need not explain here. More important than details of the construction is the fundamental idea on which it is based: the lead system according to which the vector is synthetized from the separate leads. The position of the electrodes and the coefficients of the leads are characteristic for the system. The rather great number of systems used and recommended is ominous and if not in due time an agreement can be reached, by which the greater number of systems used now disappears, I fear that VCG will be reduced to a method of minor clinical importance.

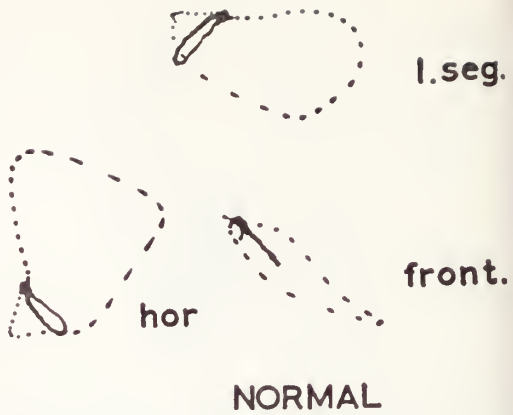

FIG. 8. Three projections of a normal vectorcardiogram.

The practical performance of VCG is quite easy. The electrodes can be applied as in ECG. The patient has to lie down and relax, while pictures of the loops appearing on the screens are taken. Only seldom do the patient's electromyographical effects obliterate the VCG to such an extent, that it cannot be used at all for diagnosis. However, it must be said that children and infants sometimes make the taking of a VCG a most nerve-wracking business. Respiration rarely gives an interference in quiet patients.

Just as in ECG the amplitude of the VCG does not give important information. It is the *shape* of the loops and the way they are described as a function of time that is important. Time is too short to give a course in clinical VCG here, so a few examples must suffice. In

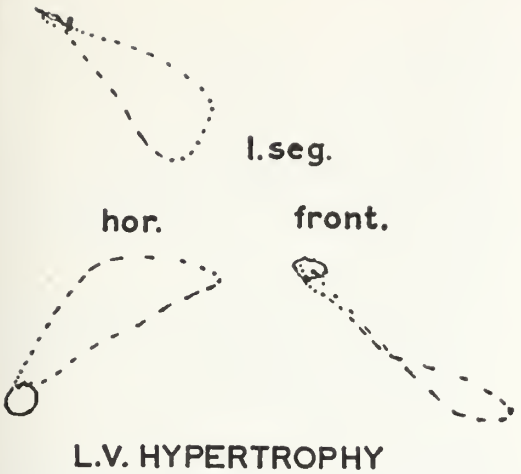

FIG. 9. Three projections of a vectorcardiogram in left ventricular hypertrophy.

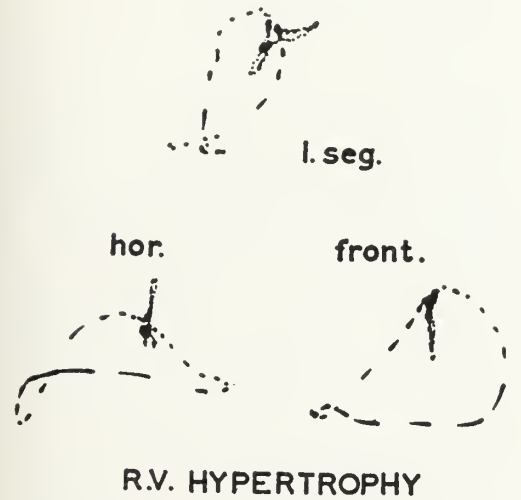

FIG. 10. Three projections of a vectorcardiogram in right ventricular hypertrophy.

figure 8 a normal loop in its three projections is shown. Figures 9 and 10 give left and right ventricular hypertrophy respectively. The predominance of left- and rightward deflections is clear and understandable.

It is specific for VCG that the abnormalities of the loop are related to anatomical abnormalities, which can often be located more or less in the heart muscle. A simple example is left or right ventricular hypertrophy localized in left or right ventricular wall respectively.

TABLE I

Similarity of BCG and VCG

a) The heart is the generator.
   Valuable means in cardiological diagnosis.
b) Three dimensional vectorial effects.
c) Integrated effects;
   the BCG is an integral over the vascular system;
   the VCG an integral over the heart muscle.
d) Methods founded on physical principles.
   These determine the relation between the directly available quantities, deflection of the bed and the electrocardiographic leads respectively, and the essential quantities, displacement of the center of gravity and heart vector respectively.
e) No discomfort for the patient.

The *functioning* of the heart is not very closely correlated to the abnormalities of the vectorcardiogram. There are cases of an abnormal VCG of a heart working quite well and the reverse the VCG of a poorly working heart can be almost normal. The performance of the pumping heart cannot be inferred unequivocally from its electrical effects.

After having given you some idea of BCG and VCG as to their physical foundation as well as their practical application, I shall now proceed to sum up the points of resemblance and difference.

First you see here a little table (Table I), giving the analogy of both methods.

Then I may ask your attention for the differences between BCG and VCG enumerated in Table II. I shall explain them briefly, although this will be mainly a recapitulation of what I have told you before.

1. Needs no explanation.
2. The ballistocardiograph causes some distortion of the ideal curve. In ULF BCG it distorts mainly the low frequencies, in HF BCG the high frequencies. In VCG, on the other hand, the response of the instrument as to frequency and high resistance between the electrodes usually is quite satisfactory.
3. The most important imperfection of BCG is the distortion by respiration. In ULF BCG it is almost impossible to obtain good displacement curves of the average patient. In

TABLE II

Differences between BCG and VCG

BCG	*VCG*
1. mechanical effect	1. electrical effect
2. distorsion by instrument	2. no appreciable distortion by instrument
3. distorsion by respiration	3. no appreciable distortion by respiration
4. often displacement, velocity and acceleration are recorded (differentiation or integration with respect to time)	4. such integrations or differentiations seldom used
5. usually only one component recorded	5. all three components recorded
6. relation between directly observable quantities and displacement of center of gravity is described by a second order *ordinary* differential equation	6. relation between directly observed quantities and heart vector is described by a second order *partial* differential equation
7. joint effect of heart and blood vessels, specially in the legs	7. no effect of blood vessels
8. vectorial effect only	8. vectorial effect combined with multipolar effects
9. only few methods are used; mutual relations are known	9. many methods (systems) are used; mutual relations unknown
10. superposition of effects of long duration	10. clearly separated effects
11. amplitude significant	11. amplitude of little significance
12. related to heart function	12. related to anatomy and location
13. valuable for prognosis	13. valuable for planning of operation

VCG respiration but rarely interferes, and if it does it can be easily stopped during a few heart beats.

4. By electronic means differentiation or integration with respect to time can easily be performed. Therefore information can be drawn at will from displacement, velocity and acceleration. These curves are often used all three. This finds almost no counterpart in VCG.

5. A trustworthy record of sagittal and lateral BCG is almost impossible at this time. The record is mostly restricted to the longitudinal component. In VCG nearly always the three orthogonal components are used.

6. The relation between the movement of the bed and the displacement of the body's center of gravity, taking into account the relative displacement of patient and bed, is described by second order differential equations. It is an easy mathematical problem with a straightforward solution. However, in VCG the relation between the voltages measured and the heart's electrical generators is given by a *partial* differential equation of the second order with boundary condition.

7. It cannot be emphasized enough that the BCG is a joint effect of heart and vessels both. If the blood vessels were entirely rigid there would not be any ballisto effect at all. It is specially the blood vessels in the legs that contribute to the BCG. The VCG, on the other hand, has nothing to do with blood vessels.

8. In BCG it is the *vectors* of displacement, velocity, acceleration only that are studied and allowed for. In VCG the action of the heart vector is obscured appreciably by multipolar effects. In the near future these effects themselves may become an object of study.

9. In principle the relation between the ULF and HF methods is known and could be allowed for mathematically. So we could deduce the HF curve from the ULF one by differentiating twice if both were ideal. In VCG the number of lead systems proposed during the last three decades or so is several times greater. Their interrelation is theoretically obscure as a consequence of the action of poles of higher order.

10. In a vectorcardiogram, just as in an ECG, we distinguish clearly separated phenomena P, QRS, T, which only seldom overlap. In BCG, on the other hand, the maxima are not

narrow peaks but superpositions of different events. Each of these events gives a relatively long lasting reaction in the vascular system. This is a consequence of the rather slow ejection of the blood and of the time taken by the pulse wave to travel down the arteries, being reflected etc.

11. The amplitude of the BCG is an important feature. The diagnostic significance of the amplitude of the VCG, i.e. the dimensions of the loops, is of restricted consequence.

12. The BCG is intimately related to the function of the heart, i.e., to the ejection of blood by it. The VCG, on the other hand, can be almost normal in a badly functioning heart, and in the reverse there may be anomalous VCG's found in hearts that function well.

13. BCG is a valuable aid in prognosis. BCG gives an indication of the physiological age of the heart in old age. VCG does not give direct information as to the expectation of life, but it is becoming of greater and greater value for the location of lesions, particularly of septal defects. This information given by VCG can give guidance to the surgeon before a heart operation and can help him in planning necessary equipment.

To conclude, I hope to have shown you that both VCG and BCG can be important tools for the cardiologist. But in the application of one diagnostic expedient or the other, it is recommended that one use a method with a sound physical basis.

New Challenges in Environmental Health Control[1]

By WESLEY E. GILBERTSON[2]

WHEN your Program Chairman invited me to join with you to present the annual Arthur Parker Hitchens Lecture, I must admit that I was greatly interested but at the same time rather concerned. I was interested because it is a privilege to meet with this distinguished group on the occasion of honoring Col. Hitchens for his significant contributions to public health. My concern was associated with my own estimation of myself as a "lecturer". Your Chairman, however, assured me that what he wanted was a short talk about future environmental problems. This I am happy to attempt. He suggested that my subject be titled "New Challenges in Environmental Health Control."

First, the very word "challenges" implies problems. In the "problem area," we have such an abundance of evidence that the mere mention of some examples, I am sure, will set off a chain reaction in your minds. Second, the use of the word "new" as a prefix connotes change —not *status quo*. Here man's own activities are producing not only change, but rapidly accelerating change. And finally, the use of the word "control" means to me that we are optimistic about being able to do something substantial to alleviate the impact of the problems. Let us see what this means.

I propose to focus with you on a broad area of public health—environmental health—which is increasingly requiring the combined efforts in leadership of a variety of disciplines—each of which must combine its talents with others to produce the needed solutions. When one thinks of the subject, "controlling man's environment," there comes to mind a most interesting question: if each and everyone of us is the combined product of heredity and environment, what will be the result on man of controlling man's environment?

Let us recall for a moment the important point of change—the changing environment. After centuries of life and development in the natural environment of clean air and water, green forests and grassy plains, man has, in a relatively few hundred years, radically altered the conditions of his existence. *Homo Sapiens* has literally become *Homo Urbans* and he is advancing into a strange and challenging environment. So let's turn the question upside down. What will be the result if we don't control man's environment—at least the hazardous elements of it - to fall within man's adaptive limits. Here we have an issue which concerns not only the environmental health worker, but each of us as members of society.

The Setting

To assist us in visualizing the setting for our message, let us consider a few of the most important factors that have an impact on our subject:

1. The U. S. population is growing. This is no secret to you. We are all part of this growth. In 1960 the Nation's population was about 180 million. By 1980 it will jump to approximately 260 million, a 45% increase in a single generation's time. It means that each year we have enough new inhabitants to make two new Philadelphias.
2. The number of urban areas is increasing. Once we were two-thirds rural—now we are more than two-thirds urban. Seventy percent of the U. S. population now lives in urban areas. Nearly half of our population is crowded on 1½% of our land surface.

[1] Arthur Parker Hitchens Lecture X, The College of Physicians of Philadelphia, 17 December 1963.

[2] Chief, Division of Environmental Engineering and Food Protection, U. S. Public Health Service, Department of Health, Education, and Welfare, Washington, D. C. 20201.

3. There are now 212 "standard statistical metropolitan areas," that is, population centers of 50,000 or more. During the period 1940 to 1960, the number of larger metropolitan areas, with a ½ million or more residents, jumped 130%.
4. The national economy is expanding. The Gross National Product, an important index of economic activity, is predicted to boom upward by 60% in the current decade. Sports cars, stereo hi-fi, polio vaccine, school books, and even Metrecal are all part of this growth.
5. Technology is diversifying and growing. Expenditures for research and development are predicted to more than double in ten years—from $13 billion in 1960 to about $30 billion in 1970. This will bring about many new products and processes in our industrialized economy. The chemical industry alone markets more than 400 new products every year. Maybe there will be ladies' "permanents" that are really permanent! Hair "restorers" that really restore! And batteries for transistor radios that will last till the owner is 21 years old!
6. Production and use of energy is soaring. The rising standard of living and increasing industrialization, coupled with population growth, will cause a near-doubling of energy use over the next 20 years. Think of the energy it would take, if we used gadgets to consume the refuse, shovel the snow, plus do school homework for the kids!

You can undoubtedly think of many more similar things that are happening in our great country that are also important, but these give us a pretty good setting.

Effects on Environment and Resources

Now what happens when these irresistible forces act on man's environment? Do they meet an immovable object? No, they do not. The environment changes.

Let's look at the water phase. The Nation's water supply is determined by precipitation. Thirty inches fall on the continental U. S., unevenly distributed by geography and season. Twenty-two inches return to the atmosphere through evaporation and transpiration. Of what remains only about two inches are at present available to man on a dependable year-round basis. But the need for water will nearly *double* by 1980 and *double* again by the year 2,000. We will not have enough "*new*" water to meet all of our needs. This means that water *re-use* becomes increasingly necessary to sustain our population growth and economic development. We must prevent water from becoming so heavily polluted that re-use is made virtually impossible.

Air is another natural resource, although we have only recently begun to think of it in this way. It is essential that we keep in mind that, in using this natural resource, it too has limitations of capacity to dilute and disperse contaminants discharged into it. In some areas already the limits are being exceeded to the point of economic damage and even health hazard.

Except for some natural forms of air pollutants, such as dust, pollens, etc., air contaminants arise principally from man's urban and industrial activities—particles, gases and fumes coming from the fuels we burn in home and factory, in transporting ourselves and our goods, from the production and processing of materials in mine and factory, from our consumption of products, and from our disposal of unwanted waste materials.

Pollutants are discharged into the relatively thin layer of air near the earth's surface—the first few hundred feet. Under favorable conditions with winds blowing, varying degrees of mixing and dilution take place. But all too often we don't have this assistance from Nature. When winds stop or when a temperature inversion stabilizes the air over a city or a region, it results in a situation like a stagnant pool of water receiving a load of pollution.

Most of the time we think of ultraviolet as rays that produce a suntan. Now we know that they also can convert certain air pollutants into

even worse ones. Given the right combination of hydrocarbons and sunlight, photochemical reaction can produce "smog"—not only in California, but anywhere.

So far we have considered wastes being discharged into the water and the air phases of our environment. Briefly, we might mention the mounting, but neglected, problem of solid wastes. This is a huge volume of trash, debris and garbage which comes from homes, commercial establishments, municipal cleansing operations, and industrial plants. Each year our average contribution per person seems to rise. Now it amounts to approximately a ton per person, per year. The disposal of solid wastes serves as a good illustration of the interrelationships between different aspects of our environment. Burning of solid wastes in open dumps or inadequate incinerators contributes to air pollution. Likewise, a dump can aggravate water pollution in streams and even in underground sources. Garbage grinders which discharge into the sewers are becoming more popular and this method too must now be taken into consideration in planning and designing public sewage treatment plants.

Effects of Environment

We have now arrived at the point where we can logically consider the social effects of modern environment. These effects may be of several different broad types:

1. Health—either immediate or long-term effects
2. Human efficiency and comfort
3. Economic effects—damage to crops, fish and wildlife, and buildings
4. Aesthetic—nuisances, unsightly appearance

Historically, the control of man's environment has been a key element in advancing public health. Today we are past the day of epidemics of typhoid and cholera. We are in a new era in which not only living contaminants—bacteria, parasites and viruses—but also "non-living" contaminants—chemicals and radiation—comprise the dangers which can assault man. To these we must add such other modern environmental insults as noise, vibration, and congestion.

But increasingly it is not possible to say that there is a cause-and-effect relationship. In the more complex types of chronic illness situations, most experts agree that, in contrast to the communicable diseases, we are often confronted by "constellations of circumstances, rather than the direct results of single determinant factors."

Three Propositions

Now, moving rapidly from the backdrop of national changes and their effects, I would like to make three propositions:

Proposition # 1

The emergence and growing significance of the subtler, chronic and long-range environmental insults to man not only will necessitate different techniques and disciplines to assess health effects, but also will require the environmentalist to develop the means to consolidate and evaluate the exposures to man that come from a wide range of media and keep these media "cleaner." The best example of this, of course, is radiation. The concept of total body burden of radiation is fairly well known, even to laymen. What we don't understand is what this means to health. As we move into the future the total body burden situation will undoubtedly apply to a wider variety of environmental insults to man. Chemicals are already coming into this picture. Vibration, noise and the tensions of congested living may well be future facets of this concept. When one couples this view with the undeniable trend toward concentration of population in large urbanized areas, the impact of hazardous substances or disturbing influences in the general environment is compounded and has special significance in relation to the approach to control. No longer can we expect to protect health solely by devices and practices which are applied at the point of use—like cooking food, or even chlorinating water at the treatment plant. The

only practical approach is the control of the problem at its source—at the point of discharge, for example. This has tremendous challenges for the environmentalist because he will not be aided so much by Mother Nature.

Proposition # 2

Economic factors and values will move up with epidemiology as a basis for environmental controls. With this change, there must be a modification in the way and extent to which "police" powers are used to underpin environmental controls. Perhaps we don't realize how the lack of an epidemiological foundation already is producing a vacuum which must be filled with a sensible rationale. As we move from the by-gone eras of pestilence and death to the future goal of positive health contributions through a good environment, the absence of outbreaks and epidemics prevents the exercise of classical epidemiology—and the guidance we formerly obtained. Moreover, the systems we often must deal with are large, complex and costly. Just to take a current question: a vast system of dams proposed for the Potomac River, including a fairly high dam a short distance above Washington, D. C. The whole system of 16 big dams and 418 small ones would cost about $500 million. But the breakdown of justification is the interesting part of the story. Although many people think of the dam construction program as one needed to provide metro-Washington with drinking water, only 13% of the cost is allowable to this benefit. Surprisingly, about 40% of the cost—or 40% of the total stored water is planned for "flushing" out partially treated wastes from the Potomac Basin's cities and industries. There is no question but that public health must be protected. The issue is whether we should accept an obsolescent technology reflected by the flushing out of incompletely treated wastes—with the attendant inundation of much land. The economics we are thinking about here are more than the usual cost-benefits ratio. It involves something that makes evaluation of public works different—perhaps we should use the word "consequences."

An interesting and simpler example of economic choices was recently given by Milliman of Resources for the Future. He cited the controversy about recreational use of water supply reservoirs. Bringing out the growing need for water recreation areas, he pointed out that health could be protected by charging for use of the facilities and then applying the funds derived to additional water treatment costs, as needed. This might be compared to the concept of toll roads.

We still need epidemiology—even better epidemiology. For example, in relation to food-borne diseases—which are a disgrace in this day and age. But my point is that our technology today often gives us more than one choice in environmental controls. The economics of a situation (and I don't necessarily mean the immediate cheapest) may be a key to the long-range solution. I hope we will have the ability to use the choices.

Proposition # 3

I believe that we must depart from one of our most cherished fallacies: that environmental controls should be exercised at the *lowest possible* level of government. Instead, it is going to be necessary to lodge responsibility at the *highest practical* level. I think I see a few raised eyebrows. Let us consider a few examples to show why I say this.

Air and water pollution are no respectors of city, township or county boundaries—in the Philadelphia region or any other.

In 99 cases out of 100, a city's solid wastes must move out beyond the city limits. Indeed we have recently learned that the rural fringe, with truck gardening, poultry raising, cattle feeding, and food processing industries, often has a sizeable refuse problem which should be attacked in coordination with the central city.

The sandwiches that are vended in my office building in Washington come from Maryland—and the salads from Virginia.

It is evident that planning is an important part of prevention. But the planners have pointed out that they can find no environmental health counterparts to work with at the metropolitan level.

The process of developing and applying environmental controls on a metropolitan or regional basis isn't going to be easy. It will strain the existing framework of local health department organizations. It will raise serious questions about agency jurisdiction and about financing of programs. It will require enabling State legislation. But I think that the proposition of placing responsibility at the highest practical local governmental level instead of the lowest possible level is essential to future solutions.

Future

It is always hazardous to attempt to predict the future. But without risking some predictions, how is it possible to plan for the eventualities that may come? So, taking a firm grasp on the crystal ball, I will venture a few guesses.

I see much greater emphasis on the planning aspects in the future than has been true in the past. This is the best way to take lessons from our experiences and apply them in the solutions of future problems. In the planning process, I see much more sophisticated methods than we now use.

Greater emphasis on evaluation of the social and mental health aspects of the environment.

Improved method of qualitation as well as quantitation.

Hopefully, the evolvement of a systems analysis approach to planning.

I also see health departments necessarily involved in a wider circle of collaboration than other groups and agencies, and making greater use of the skilled amateur. This is inevitable in the growing complexities of urbanized regions. Environmental health has a broad implication which touches on controversial aspects of urban life, including transportation, industry, business, and of course, legislation, taxation, etc. Finally, I see new program areas beyond the ones we call "new" now, such as radiological health, air pollution and pesticides. I refer here to such future environmental stresses as noise, vibration, and other forms of urban impact on the human organism. And, most significantly, I see the beginnings of approaches to environmental controls through which positive contributions to health may be derived.

Caspar Wistar *On Depression*, 1786: An Eighteenth Century Psychiatric M.D. Dissertation[1]

By WILLIAM D. SHARPE, M.D.[2]

CASPAR WISTAR was born in Philadelphia in 1761 and died there in 1818. A member of the Society of Friends, he attended their schools and served as a nurse during the Battle of Germantown, although religious persuasions apparently prevented his service in the army. He spent three years as an apprentice to Dr. John Redman, of Philadelphia, and attended the University of Pennsylvania, where he was graduated M.B. in 1782. He spent 1783 in England, and two years at Edinburgh, where he was graduated M.D. in 1786.

After graduation, he returned to the United States, married and began a busy and successful practice. He was physician to the Pennsylvania Hospital from 1793 until his resignation in 1810. He was Professor of Chemistry in the College of Philadelphia in 1789, and when this institution united with the University of Pennsylvania, he became adjunct Professor of Anatomy, Midwifery and Surgery in 1792, succeeding William Shippen Jr., on whom he wrote a memoir (1), as Professor of Anatomy in 1808. He published a two volume textbook of anatomy in 1811 (2), and apparently his interest in psychological medicine ended with the publication of his M.D. dissertation (3).

Wistar took his M.D. at Edinburgh: many American physicians had done so, and the claim of the old school was strong. The degrees of Scottish universities were not held in consistently high esteem in England during the latter part of the eighteenth century, but Oxford and Cambridge degrees required not only membership in the Anglican Church, but definite terms of residence, amounting in the case of the M.D., to fourteen years. The Scottish universities offered sound training in medicine to anyone who would invest the necessary time and effort, but no definite period of residence was required. Since there was no prescribed course of resident studies, degrees could be obtained *in absentia*. Candidates needed only letters of recommendation (who would refuse?), a thesis (rumored sometimes to have been written to order by "editorial consultants") and the fees (4). Consequently, a Scottish M.D. degree could represent excellent medical training or it could represent the purchase of a medical qualification from a diploma mill. The degrees were without status in England, and their holder was ineligible for the fellowship of the College of Physicians, but their value in the colonies was high.

The best contemporary British medical training was the hospital centered system of apprenticeships, leading to the examinations and membership of various societies of physicians, surgeons or apothecaries. The leaders of late eighteenth and early nineteenth century English medicine were, for the most part, trained in such programs, conducted independently of University medical faculties. These programs were too long—three to five years—to appeal to Americans who wanted the polish and status of an M.D. diploma. Dr. Packard was excessively generous when he stated that the appeal of Edinburgh was its high standard (5): Edinburgh was the quickest, cheapest and most painless route to the M.D. for an American who had already spent several years apprenticed to an established practitioner.

At age 25, Wistar had to present a disserta-

[1] Read before the Section on Medical History, The College of Physicians of Philadelphia, 8 January 1963.

[2] Curator of the Historical Library, Pennsylvania Hospital, Philadelphia 7, Pennsylvania. Present address: Department of Pathology, Seton Hall College of Medicine, Jersey City 4, New Jersey.

tion for the M.D. The last thing any teacher, research institution or learned journal wants is an original student, and the student essay or dissertation is a valuable source for medical history since it almost always represents, pure and undefiled, exactly what a bright and ambitious young man knows that his teachers want him to think about the topic under discussion. The more clever the student the more faithfully he records what his teachers want him to record, and since Wistar's subsequent career demonstrates considerable facility in landing on his feet, it is safe to presume that his 1786 M.D. dissertation faithfully summarizes what the promising young medical student of his day was expected to think about psychological depression.

Latin Style

Many physicians, whatever their classical training or lack of it, who wrote before about 1750 did so in an unpolished but inoffensive Latin. Some read and corresponded across linguistic boundaries, and shared a common training which included not only the usual school authors but medical works in Latin, whether of post-classical or contemporaneous origin. Although the tradition of extempore Latin medical writing was pretty much over in England and France by 1700, it persisted throughout much of the 18th century in the Low Countries, Italy and Germany.

Eighteenth century boys who went to school at all studied Latin and Greek for some years without learning—or intending to learn—either. The composition of a Latin academic dissertation was a chore, and most such 18th century productions provide ample evidence of translation from a modern language into Latin words (6). Wistar's *De animo demisso* is florid, pedestrian 18th century English carelessly transliterated into Latin words with very little attempt to use Latin modes of thought or style. There is only a shaky grasp of the difference between the indicative and subjunctive moods, between direct and indirect discourse, or of the values of the Latin tenses. Some passages are quite uninterpretable without a knowledge of English. It would be tiresome to cite too many examples, but these are typical: (p. 2) *quo minus ingruat tristitia obstant* = "are the less able to stand up when sadness attacks;" (p. 3) *qualia ab eodem viro illustri usurpantur* = "such as those used as examples by the same distinguished man;" and (p. 37) *summi autem momenti est* = "it is of the greatest moment."

Wistar's Latin, whether he composed it or signed his name to the work of a professional translator is immaterial, is inelegant and uncultured. This is less an adverse criticism of Wistar than an indictment of an educational

DISSERTATIO MEDICA
INAUGURALIS,
DE ANIMO DEMISSO.

QUAM,
ANNUENTE SUMMO NUMINE,
Ex Auctoritate Reverendi admodum Viri,
D. GULIELMI ROBERTSON, S. S. T. P.
ACADEMIÆ EDINBURGENÆ Præfecti;
NEC NON
Amplissimi SENATUS ACADEMICI consensu,
Et nobilissimæ FACULTATIS MEDICÆ decreto,
PRO GRADU DOCTORIS,
SUMMISQUE IN MEDICINA HONORIBUS ET PRIVILEGIIS
RITE ET LEGITIME CONSEQUENDIS;
Eruditorum examini subjicit
CASPAR WISTAR, M. B.
PENNSYLVANIENSIS,
SOCIETATIS NATURÆ STUDIOS. EDIN.
NEC NON
SOCIETATIS REG. MED. EDIN. PRÆSES ANNUUS.

The spirit of a man will sustain his infirmity; but a wounded spirit who can bear!
SOLOMON.

Ad diem 24. Junii, hora locoque solitis.

EDINBURGI:
Apud BALFOUR et SMELLIE,
Academiae Typographos.
M,DCC,LXXXVI.

Fig. 1. Title page of dissertation.

system. It is simply untrue that Wistar and most of the physicians of his era were accomplished classicists. The colonial B.A. degree, conferred at age sixteen or eighteen by colleges which have since become distinguished universities, represented nothing more than a superficial high school preparatory course which would ill-prepare a modern boy for his first year college course in classics or anything else.

Sources

The 18th century saw medical systems of every kind, and elaborate schemes were prepared for the classification of disease, perhaps under the influence of Linné's approach to the vegetable kingdom. The iatrophysical school as a whole was impressed by mechanical or organic causes for disease, including psychiatric disorders, and preferred to think of diseases as specific entities which originated in a mechanical fault of some kind. Whether the explanation was that of George Cheyne (1671–1743) (7) that all nervous diseases came from relaxation or weakness in the solid parts of the body, especially the nerves, or that of Robert Whytt (1714–1766) (8) that mental disease developed when something interfered with the "sensitive soul," propagated through the brain and spinal cord is immaterial, and the cause was considered physical. Nevertheless, the greatest of the 18th century psychiatrists, Vincenzo Chiarugi (1759–1820) found it useful to retain the two thousand year old descriptive classification of mental disease into melancholia, mania and dementia (9).

William Cullen (1712–1790), Wistar's Professor of Medicine at Edinburgh, generally followed Boerhaave's classifications of disease, and was among the first University teachers in Europe to provide medical instruction in a vernacular language. Formal bibliographies were not a feature of eighteenth century writing, medical or otherwise, but Wistar refers directly to eleven works as sources for his information on psychiatry. Cullen's *First lines of the practice of physic* (Edinburgh, 1786) and his lectures on physiology; Priestley's edition of Hartley (10); Albrecht von Haller (1708–1777), *Elementa physiologiae corporis humani* (Lausanne, 1757–1766); Francis Hutcheson (1694–1747), *An essay on the nature and conduct of the passions* (London, 1728); Edmund Burke (1729–1797), *A philosophical enquiry into the origin of our idea of the sublime and beautiful:* David Hume (1711–1776), *Dissertation on the passions* (11); Thomas Sydenham (1624–1672), *Dissertatio epistolaris ad ... Gulielmum Cole* (London, 1682); Adam Ferguson (1723–1816), *Essay on the history of civil society* (Edinburgh, 1767); and an *Account of the dispute between Messrs. Hume and Rousseau.*

Over and above rhetorical flourishes provided by citations from Solomon (Proverbs 18:14), Horace, and John Armstrong (12), Wistar refers by name to a number of roughly contemporary writers. William Cullen is cited eleven times; Sydenham and Whytt get three references apiece; Hume and Hutcheson two each. Edmund Burke, Campanella, Cheyne, Ferguson, Haller, Hartley, Judge Home (13), Priestley and Vertot are each mentioned once. This may reflect wide medical and non-medical reading, but it seems also to suggest the extent to which 18th century psychiatric nosology was involved with what the 19th century would have considered moral philosophy and literary criticism.

Influence

It is difficult to assess what, if any, influence Wistar's dissertation had on psychiatric thought. The publication of a dissertation was a required part of the M.D. program, and there seem to have been printers who specialized in the preparation of small editions of such student efforts, at the student's expense (14). The work is not listed in Watt (15), Callisen (16), or either series of Ploucquet (17), all of which index large numbers of doctoral dissertations, and it probably went almost unnoticed, although it does appear in the *Index catalogue of the Library of the Surgeon General's Office* (Washington, 1895, vol. 16). Wistar likely received at most a few hundred copies of the dissertation from the printer, and distributed

them as best he could. Absence of the *De animo demisso* from the standard medical bibliographies of the time suggests that its total influence must have been even less than that of most such dissertations.

The Dissertation

Wistar's *De animo demisso* is a dissertation submitted to the University of Edinburgh as part of the requirements for the M.D. degree, and is bound by the conventions of such documents. Freed of preliminary skirmishing, an English translation runs to thirty-five double spaced typescript pages, about the length of a modern review article. The title page drips with Latin superlatives, and the dedications to Benjamin Franklin and William Cullen, the latter Professor of the Practice of Medicine at the University of Edinburgh, are in the effusive style of such 18th century formalities. At the end of the text is appended an apology, and an acknowledgment to the "distinguished and learned professors" of the Universities of Pennsylvania and Edinburgh; to Wistar's Philadelphia preceptor, John Redman; to John Jones, of Philadelphia and New York; and to Charles Stuart, an Edinburgh friend.

Wistar begins with the observation that depression is a common disease, but that since its causes are not grossly evident, it attracts less attention than it deserves. Although small upsets disturb such patients greatly, only the patients themselves fully appreciate the extent to which this is so. Wistar feels that this common but much overlooked condition deserves attention, often emphasizing the frequency of depression and that one depressed patient can communicate this feeling to others.

Diagnosis

Wistar defines depression largely in terms of the English *vapours* or *low spirits*, and his discussion includes both the manic-depressive state and endogenous depression. There is no mention of a specific involutional melancholia, or of suicide.

Depression can occur by itself, or it may be associated with such diseases as hypochondriasis, dyspepsia, atonic arthritis, hysteria or scurvy. All gradations of the condition occur, ranging from slight reluctance to participate in social activity to frank stupor. Depressed patients continuously ruminate on unhappy subjects and are pessimistic about the future. Generally, an abrupt onset favors a rapid recovery: women are more frequently affected than men, and no occupation or degree of intellectual brilliance is spared. Patients prone to depression are often lonely and sad but can't explain why. This sadness is sometimes relieved by conversation or work, but some patients are so affected that they are unable to do anything at all. Such patients tend to be labile in their moods, vacillating, sluggish and prone to ill-temper. Many such patients are highly intelligent.

The differential diagnosis of depression includes hysteria, in which the patient's mood is easily manipulable; dyspepsia and hypochondriasis, which are quite different since they are chronic processes with many relapses. Wistar seems to regard a labile personality, swinging between extreme depression and extreme hilarity, as a distinct subgroup, possibly a manic-depressive syndrome. He suggests that such patients take away their sadness by an excess of joviality, that this is in itself a danger and that depressed individuals in this category, when cheerful, are as prone to happy thoughts as they are to unhappy ruminations when ill.

Wistar pays some attention to the factors which make a study of psychological depression difficult: human beings naturally tend to observe things external to them, and not their own psychological processes. Although people have "consciousness" and the condition of their minds changes rapidly, they neither observe these changes, enquire into nor explain them. Even the great Cheyne, although himself subject to fits of depression, reported only his subjective somatic sensations without comment on his more personal feelings, or any further explanation.

It is easy to confuse the cause of depression with its effect, and this is common, as is a tendency to ascribe the depression to any cause

which strikes the fancy. Depressed patients' thoughts seem to dwell on a single topic, and a fundamental difficulty in thinking reflects itself in a difficulty in carrying on a conversation. Depression often follows solitude, boredom or frustration, and may manifest itself in an inability to follow through a train of thought.

Differential Diagnosis

Depression can at times have the effect of a species of insanity, and be accompanied by delusions, but depressed patients are not *ipso facto* deluded and, at law, without such delusions, a patient is not insane. Wistar points out that human experience varies so much that the content of delusions must be assessed in terms of the individual's own social and cultural experiences:

> ... Only those things make us certain of false judgment which are incompatible with the testimony of the senses or of experience, and that is why they are absurd. Our experience is so different that some things may appear absurd to other men. For example, insanity may manifest itself in a scientist as a belief that an eclipse of the moon has been brought about by interposition of a demon's hand before the moon's light, but this is believed by an Indian who is just as sane as you please. In the same manner, many indescribable fears beset the minds of the sick, such as—for example—those who believe that they have animals in their bellies, which arise from their disturbed sensibility, and even if they seem absurd to the physician, nevertheless, they are a serious indication that the poor man is insane and depressed by sadness, while the mistaken belief just mentioned would indicate that the Indian was insane (18).

The two forms of psychotic illness designated as mania and catalepsy must be differentiated from depression, but social withdrawal may be an early sign of either condition. Wistar describes but does not otherwise comment on a depressive psychosis with somatic delusions, and classifies this as a true insanity.

Depression is not ordinary sadness such as that which follows, for example, the death of a brother or close friend, but is rooted in a certain mental habitus and may be accompanied by agitation. Those subject to depression are frequently made sad by trivial or inexplicable causes, they tend to feel worse in the morning and their psychological state is sometimes related to their physical condition. Depressed patients are typically very concerned with their physical health, and are subject to vague illnesses which serve only to focus their attention on their health—abdominal palpitations, bladder pains, hot and cold flashes, vertigo, clavus hystericus, numbness of the feet, etc.

Bodily constitution and temperament is variable in such patients, but depression tends to be both more profound and more protracted in patients with the melancholic temperament, the only one of the four temperaments considered, by itself, premorbid. In patients with very labile temperaments, those who were happiest become the most deeply depressed. Wistar ascribes this to a certain "harshness" of the humors.

Etiology

Wistar follows the widely held 18th century view that mental disease, including depression, depends on the state of the body. He attaches considerable importance to the unexplained, but obvious, effect of wine and opium on the mind to support this thesis. He mentions that everyone becomes depressed under certain circumstances, and that at such times, wine and opium cheer people up by providing new material for thought. He cites Cullen and Judge Home that in depression, no unity of thought interrupts a succession of unhappy thoughts, so that unhappiness begets unhappiness. Wistar mentions that the duration of feelings after strong emotional stimuli may dispose to a happy or sad state of mind, and that imitation of the mannerisms adopted by people in various states of mind may induce that same state in the mimic. After considerable circumlocution, he concludes that dependence of the mind on the body can be neither proved nor disproved except in rather special cases.

The brain is the organ chiefly affected by the stimuli which lead to happiness and unhappiness, and the brain's receptivity to such stimuli may vary independently of the

brain's control of various bodily faculties. In extremely depressed patients, the mind may seem weaker than is normal, but there is no necessary connection between mental depression and the state of the body. There is no change in the volume, force or rate of the pulse, and factors influence thinking which do not affect physical condition. Although generalized physical weakness may at times accompany sadness, all that can be concluded is that different things affect different people differently. Mental tendencies may depend upon habits induced by factors external to the patient, and which may be independent of his desires. He suggests that depression may influence moral responsibility: "it may not be too far from the truth that some human acts, whether creditable or discreditable to human nature, are effects of the mental affections we consider" (19).

Case Histories

Omitting passing footnote reference to two unhappy individuals who became "dead drunk" without antecedent cheerfulness which he cites as exceptions in his discussion of the efficacy of wine and opium in cheering up the unhappy, and to the man whose pulse was found to be normal during and after a spell of depression, Wistar refers to seven patients in enough detail to permit some idea of their psychiatric diagnosis. His longest discussion deals with the dispute between Jean Jacques Rousseau and David Hume. This deserves citation in full although, perhaps, it is not strictly a case report.

> I think that certain acts of the celebrated Rousseau, so foreign to what is usual, are to be attributed to a mental habitus very much like the one we discuss. It is scarcely possible for me to believe that he wanted ill-will with the distinguished David Hume. He seems to have misinterpreted the harsh things he mentions, and I have persuaded myself that he thought many things truly serious which others would have considered trifling. Once, I suggest, such suspicions entered his mind, he believed many to be facts, and that he tormented himself with things unfavorable to himself. One particular thing used to annoy him, though it would bother others very little, which he also made into grounds for unhappiness: "staring or an excessively sharp look of the eyes," with which he gravely charges David Hume. Whenever two men simultaneously look into each other's eyes, I believe that both are affected. Such a man feels that two things are true: he convinces himself that he into whose eyes he looks thinks the same about him, and he also knows that the other is himself persuaded of the same. It is unpleasant for them to stare at each other unless they speak. Fear suddenly possesses a depressed man lest the other look at him disdainfully or (as is said in English) "with an evil eye," and this suspicion seems to me to have caused the diffidence which developed between the famous men Hume and Rousseau (20).

Literary psychoanalysis must be beyond the pale of medical historiography, and whether or not Wistar's diagnosis of depression be correct, it is important that Wistar ascribed Rousseau's aberrant behavior (or some of it, at least) to personality factors related to those which cause depression.

Wistar cites what may have been a patient suffering from an obsessive-compulsive syndrome, most unsure of himself, and fearful of arousing suspicion:

> A reliable man who suffered from depression took a walk to amuse himself and when he came to a bookseller's to purchase a book, he put down a volume which he had bought in another bookstore and which he was carrying with him in order to inspect another book. Before he put down the book he had with him, the thought entered his mind that those in charge of the store might become suspicious that he was stealing some books from them. This caused such fright in his mind that he forgot the book he had placed there. A healthy man, if he had been there, would have no such thing in mind or, if it occurred to him, it would have aroused no such fear (21).

Wistar cites five other patients in insufficient detail to constitute case histories. A judge who withdrew from social activity when an important case was before him, but who was usually affable when routine matters were at hand—this is less depression than preoccupation. Two women are mentioned, one at the Edinburgh Infirmary and one at Pennsylvania Hospital, who kept weeping and who when interrogated, either could not answer why they wept or gave contradictory answers. Possibly these were cases of involutional melancholia. He gives the example of a Jacobite

who shocked a group of his friends following the death of Charles I by a question as to the value of a denarius: his friends felt better when they saw the perhaps fanciful analogy between Charles I and Christ. This is an anecdote and not a case history, a distinction not always clear in psychiatric literature. The other patient cited suffered from atonic arthritis and, although overwhelmed by much company, became more cheerful with a single friend.

Treatment

Wistar emphasizes that treatment must be adapted to the individual patient's physical and psychological needs, neither of which may be ignored. Although real sources of distress and anxiety for the patient must be removed, excessive solicitude may aggravate his condition. He will be helped by knowing that many similarly affected patients, even after years of ill health, became quite well. The outlook for recovery is better if no other signs of illness are present and if the patient both faces the fact of his illness and cooperates with treatment. Exhortation is valueless, and even Sydenham fell into this error.

Opium and wine may be used, but must be used cautiously because of the risk of habituation, and wine is safer than opium. Pleasant surroundings and conversation are more beneficial, and pleasant companions are very important. It is not necessary to limit conversation to trifling matters, but the patient's more serious personal concerns might be avoided. Cheerful reading is beneficial when there is no one with whom the patient can speak, and it is better if the patient himself can be actively engaged in conversation.

Regardless of the etiology of the depression, exercise is beneficial. Long walks in company with someone to comment on the passing scene are helpful, and the mental concentration required in guiding a horse is stimulating and, in any event, loneliness must be avoided.

> Physicians seem agreed that, whether they believe that the disease arises from an acid or an alkaline acrimony, or from black bile in the blood, or from an ataxia of the nervous fluid, or from an irregular action of the viscera or only from relaxation of the nerves, exercise is of the greatest importance, something which they confirm by all their arguments (22).

If exercise is beneficial, strenuous exercise is better still, and regular employment best of all. Dyspepsia is a danger and although diet must be watched very carefully, the patient's greatest danger is in idleness and frustration.

The depressed patient can be relieved if the physician is alert, and "the physician rarely encounters patients more ill than these" (23). Neglect can be disastrous, but their cure not only makes miserable people happy but—and Wistar was a child of Light—increases their economic usefulness.

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Extinct Medical Schools of Nineteenth-Century Philadelphia:

(VII) Last Days of the Bogus Schools

By HAROLD J. ABRAHAMS, PH.D.

AS HAS already been pointed out, the sources drawn upon for the discussion of the Eclectic schools were, in very large measure, the publications of these very schools, making it desirable to present a report based upon an examination of sources not slanted in favor of these institutions. Such a report, the story of the last evil days upon which the schools fell, may be pieced together from the pages of the *Philadelphia Record*, from February 28, 1880 until March 25, 1881.

On February 27th, 1880, two Philadelphia Record men, Lucius Maynard and John Norris, the paper's city editor, called upon T. B. Miller, A.B., D.D., M.D., Dean of the Philadelphia University of Medicine and Surgery at 209 N. Tenth Street and asked about the possibility of becoming students at the Philadelphia University of Medicine and Surgery. After showing them, by demonstrating the art of prescription-writing,[1] how easy it was to practice medicine, he arranged to make medical practitioners of them for $100 each, with the right to hang out their shingles immediately upon payment of that sum. When the "students" protested that they had no diplomas, the Dean said: "I'll settle that," and promised them certificates to practice medicine with which no Legislature nor body of men could interfere in any State of the Union. They could have their choice of three different diplomas—that of the Philadelphia University of Medicine and Surgery, the Quaker City Business College of Arts and Sciences, or the Penn Medical University. When asked whether one corporation can act "under three different charters," Miller replied that it could and added that he "took hold" in 1876 and had been running the corporation ever since. In addition, he was pastor of Eden[2] Methodist Church at Fifth Street and Lehigh Avenue. After reassuring them that they could practice immediately, he advised them to purchase a few books, the total cost of which was less than ten dollars, and to "attend to the cases" at the School of Midwifery, on Thirteenth Street. "If you get into any trouble, I'll see you through," he added. He then showed them three bottles containing aconite, belladonna, and nux vomica, respectively, remarking that they

[1] "We will take my mixture for dentition—that means teething, children's teething . . . Make an R, with a tail around it; that stands for "Take" . . . Z stands for drachm, oz. for ounce and gtt stands for drops." Asked one of his students: "What word is it (gtt) derived from?" Replied the teacher: "Why, drops—gtt stands for drops." He then wrote and "explained" the following prescription:

℞ Phos. of iron gr. V
Phos. of lime gr. X
Carb. of mag. gr. XX
Simple syrup ox. IV
M. ft. sol.
Teaspoonful, four times a day.

A Record reporter later showed the prescription to Dr. J. V. Shoemaker and told him that he intended to give the medicine to an eighteen-months old infant. Upon reading it the doctor laid his hand upon the reporter's shoulder and said: "You need rest. Your mind is disturbed." "Why?" asked the reporter. He was told that after three days the infant would be transformed into an angel. The reporter withdrew, remarking as he went that, instead of giving the medicine to the baby, he would give it to some of his wife's relatives, for he could better afford to lose them. (The toxic effect of this medicine was, of course, facetiously overstated by the Record reporter.)

[2] Kingsley M.E. Church, according to the Record for March 1, 1880.

would cure every disease man ever had. He also showed them a pocket-case, containing ten vials, and told them that these, a total of thirteen bottles, would be all that was needed. To their query as to how long their education would take, he replied that he would take them as his private students and that they were to come to him once a week to recite, then attend the lectures next winter. "You need not take a full course—I will fix that." He showed them the ten by twelve foot museum, which consisted of but one case of dusty wax models, and asked, "Ain't that a wonderful museum?"

The "students" arranged to return at seven o'clock that evening with as much of the $100 as each could scrape together. Upon their arrival they were met by a stranger who asked some questions, after which Miller appeared and apologized for his lateness, which, he said, was caused by his having to treat "a very serious case of sickness." Upon payment of only twenty-five dollars and the promise to pay some of the remaining seventy-five dollars at the close of the course and the remainder upon receiving the diploma, Miller repeated his assurances that the following certificate, which he gave to a student who entered the college, gave him the right to hang out his shingle at once, but that if any trouble arose, Miller would always take care of it:

Certificate of Scholarship

No. . . .

Philadelphia University of
Medicine and Surgery

This is to certifiy that, in consideration of the sum of One Hundred Dollars, the receipt whereof is hereby acknowledged, the holder of this certificate is entitled to Two years Scholarship and Tuition in the Medical Department of said College.

Witness the Seal of the College, Twenty-seventh day of February, 1880.

W. J. P. Ingraham
Pres. Board of Trustees

Attest: Wm. Major, Sec'y.

Dean Miller then entered the names of the two applicants as members of the previous October-February term, which had already ended two weeks before the evening of which we are speaking. He remarked, ". . . all you need now is to attend next winter. Your names will be published in our announcement for 1880."

Further haggling between the Record men and the Dean caused him to write out the following certificate:

THIS IS TO CERTIFY that the bearer, Mr. John Norris, in lieu of taking out tickets and entering the "Philadelphia University of Medicine and Surgery" under the direct supervision of the Dean, is entitled to practice medicine from this date.

T. B. Miller, Dean,
Philadelphia University of Medicine and Surgery, February 27, 1880

Miller then filled out a matriculation card for the previous term (i.e. the term that had already ended) at the Philadelphia University of Medicine and Surgery, and a course card for each of the following: Anatomy and Histology (Prof. E. E. Wooster), Surgery (Prof. J. R. Rowand, M.D.), Physiology and Hygiene (Prof. Wm. Hargraves, M.D.), Obstetrics and Diseases of Women and Children (Prof. Thomas B. Miller), Chemistry and Toxicology (Prof. John Kaye, M.D.), Theory and Practice (Prof. Wm. Hargraves, M.D.), Materia Medica and Therapeutics (Prof. W. B. Orvis, M.D.), a total of eight cards. Two cards are reproduced below. He pointed out that the cards were all dated as of the previous October 6 and said: ". . . [they] will give you the benefit of a claim to having passed the first course. One more course is all that is necessary to entitle you to a diploma from the Faculty. I will see that you receive it."

Philadelphia University
of
Medicine, Surgery and Pharmacy
Medical Department
Matriculation

By John Norris

T. B. Miller, M.D., Dean

Session 1879–80

Philadelphia University
of
Medicine and Surgery
Medical Department

Admit Mr. John Norris
to Lectures on
Anatomy and Histology
By Prof. E. E. Wooster
October 6, 1879.

The seal of the University being missing from the Certificates, he promised to have a supply on hand the next day, so that he could affix them to the documents. He urged them, while bidding them good-night, to let him hear from them. He did indeed hear from them, if he read the exposé in the Record next morning.

What kind of man was Thomas B. Miller? It was reported that he was a man of "moral worth," and that the members of his church felt him to be a most popular and effective preacher, who had somehow made a connection with a medical school which by that time was in bad repute. Associated with him were the Reverend W. J. P. Ingraham, President of the Board of Trustees, preacher in a Methodist church, who during the week was in business at 45 Strawberry St., (Market to Chestnut Sts. between Second and Third Sts.), and the Reverend William Major, Secretary of the Board of Trustees, pastor of the Centenary (M.E.) Church at Forty-first and Spring Garden Sts., sabbatarian and prohibitionist. The rent on the premises at 209 North Tenth St. (in part occupied by a drug store) was sixty dollars per month, and had not been paid for seven months at the time of our story, until the Constable of the Fourteenth Ward assisted in the collection of about $350 of the $420 in arrears. The levy made necessary by failure to pay the rent revealed the presence of some of the effects of a college (with which, according to the Record, Dr. Paine was associated) on Ridge Ave. above Wallace St., a short time earlier.

The Board of Trustees of the College, soon after the exposé by the Record, called for Miller's resignation on the grounds that he had had no right to issue a certificate such as the one which he made out for Norris, and he promptly obeyed the will of the Trustees, giving up his post as Trustee, Dean and Professor. The Trustees felt no disgrace for themselves, claiming that Miller had acted entirely on his own in issuing the "receipt." William Major, who was adjunct professor of physiology in addition to being Secretary of the Board, told a Record reporter next day that diplomas were issued only to persons who had studied at the College for two terms, had passed an examination, and had been approved by the Board. He denied the allegation that diplomas were signed in blank. The Reverend Mr. Ingraham stated that he too was a graduate of the Philadelphia University of Medicine and Surgery (as were Miller and Major), that the charter owned by Paine had been purchased by his group, and that as the attempt to "break down Dr. Paine" had failed, so would it fail in the present attempt. Further questions by the reporter elicited the information that the entire Faculty were graduates of the school.

The "concern" was now in trouble. Dr. E. D. Buckman, Secretary of the Corporators of the Penn Medical University, denied the truth of Miller's claim that it had sold the charter of that institution or that it had any intention of doing so. Miller's group did own the Quaker City Business College[3] which had the right "to teach all branches of learning necessary for the thorough theoretical and practical education of young men for the various duties and employments of business life, and to impart instruction in such branches of literary and scientific knowledge as may from time to time be deemed expedient." But few or no degrees had been conferred under this charter because the word "medicine" was missing from its name. Nearly all the diplomas were granted in the name of the Philadelphia University of Medicine and Surgery, whose very existence was by now thought to be mythical, since Paine, unlike Buchanan, had

[3] The charter was granted in 1860, and was purchased in 1879 by Miller. The Trustees of his school issued degrees of A.B., A.M., M.D., D.D., and LL.D. under the charter of a Business College, three of the Faculty holding such D.D. degrees. On February 28, 1880, William Paine wrote to the Record: "I have no interest in this, or any other institution."

not fought the repeal of his charter by act of the State Legislature, and all diplomas issued by it since the repeal-act could be worthless.

The accounts in the newspaper included the case of one person who won his sheepskin after but three weeks of attendance. Another, a barkeeper and moonshiner from Cohoes, New York, had journeyed to Miller's mill, and, after a brief time, returned with his diploma. Soon thereafter he was called as a witness in the celebrated Latrimouille murder trial, where he admitted, on the witness stand, that he had not written a medical thesis (laughter by the Court and lawyers), "could not remember" the names of the authors of any of his textbooks, and stepped from the stand "amid the ridicule of the people and the press," after sharp comments, by the attorny for the prosecution, upon the institution that would enable such a man to stalk around in the community as a medical practitioner.

Another item brought to light was that the University claimed a dissecting room at the rear of the fourth floor. The City Solicitor's office showed no record that the University had given the bond required by law, that bodies will be dissected "only for the promotion of medical science." Either the school was not giving a course in anatomy[4] (despite its claim of having a professor of this subject) or it was violating the law by failure to post the bond.

Another lurid story is that of a nine-months old infant, whose mother noticed that the baby had a swollen knee. Dr. Miller diagnosed the case as that of a broken leg, and ordered the baby strapped down in its crib after he bandaged the knee tightly. A day or two later he brought a "professor" and four other physicians from his college for a "consultation." They shook their heads gravely and set the following Monday as the date for the amputation. The mother, in the meantime, took the baby to Jefferson, where she was advised not to permit amputation and, above all, not to allow the administration of ether. She was asked to bring the baby after another week for a more thorough examination. Instead she took the baby to a man who cured by laying on of the hands. He told the mother that the child had run a pin or needle into its leg and explained to her how to work out the foreign body, which she succeeded in doing, using a pair of forceps for the final stage of removal. On the appointed Monday, Miller, the professor and the rest of the entourage arrived "with a large bottle of ether, knives, saws, hammer and chisels." The child's father showed them the door, and the group left, not without loudly protesting the fact that they wished to have their fee paid.

Another story of interest is that relating to a wealthy businessman who found time to study for two years at the University. His mind became impaired and he had to be confined in an asylum. But a seventy-five dollar fee had been paid the University and the man's relatives thought that that entitled him to have his diploma. They sent down to the University for it and were given a diploma, signed by W. Paine and others, the document being an exact copy of those issued by Miller, who claimed to own Paine's charter. Thus an insane man was given a medical school diploma.[5]

[4] The Record for June 14th expresses its belief that "perhaps in no instance did the doctor mill comply with the law requiring three years of study."

[5] Among a miscellany of charges by the Record:

1. A G. F. Goersen held a diploma from the Philadelphia University of Medicine and Surgery, bearing the date 1870, when Goersen was sixteen years old. His belief in his ability as a doctor ended in his poisoning of his wife and mother-in-law, and the Record called him a murderer, fastening the blame for this upon the sellers of the diploma.

2. The graduation list of the session 1864–65 did not include the name of William B. Orvis, Professor of Materia Medica, but he claimed that he was a "graduate" of that date. The list of graduates did include the name of a certain Perpente, an abortionist, who "packed the dead body of one of his patients in a barrel and sent it to the pickling vats of a medical college," hoping thereby to hide his crime. The list also included a large proportion of all the abortionists tripped up in the preceding eight years, as well as many quacks who were running dispensaries around town.

3. Buchanan charged that Paine, whose books fell into his hands, by error, after the legislative investiga-

The Faculty for the last sessions of the University presents an interesting picture. There were now eight professors and three students. Of the eight professors, three were ministers of the Gospel—Miller, Major, and Orvis. Two were persons who had only just graduated from the school—Wooster and Kaye. Three had "pedigrees" that have not been traced:

Thomas B. Miller, M.D., Obstetrics and Diseases of Women and Children, also Clinical Practice and Surgery, and Dean; William Hargraves, M.D., Theory and Practice, also Physiology and Hygiene; William B. Orvis, M.D., Materia Medica and Therapeutics; E. E. Wooster, M.D., Anatomy and Histology, also Demonstrator of Anatomy; John Kaye, M.D., Chemistry and Toxicology; William Darmon, M.D., Surgery; William Major, M.D., Adjunct in Physiology; T. B. Taylor, M.D., Anthropology. Three other adjuncts—Caroline H. Spear, H. Dixon Cooper, and E. W. Anderson (physiology and anatomy, clinical practice and theory, practice and pathology, respectively) had been appointed upon graduating, making a total of five such appointments.

Thomas Miller was expelled from the ministry.[6] William Major protested that his activities as Trustee, Secretary of the Board, and adjunct professor were only personal favors to Miller, who had requested them. He admitted never delivering a lecture nor acting as a professor in any other capacity. He denied knowing of any irregularity in administration or granting diplomas—on the contrary, he claimed that he knew of cases where the diploma was refused certain candidates because the Faculty thought the persons unfit to practice medicine. In a letter to the editor of the Record he also denied signing any diplomas, albeit he did sign certificates of scholarship, which was his legal right. When asked to produce the lecture tickets issued to him when he was a medical student, he produced five tickets (now sixteen years old). None of these was printed in the corporate name of the College, nor were they signed by the professors who gave the lectures, and the most important one even bore a date previous to the time when the professor's connection with the school had begun. The Record men had obtained a letter from the professor in question repudiating the lecture ticket. The Record for March 19th published a long article taxing Major either with having a full knowledge of all the irregularities which have been listed above, or being of dull mind. Mr. Major was suspended from the ministry for one year. On April 14th the Record reported that William B. Orvis, Professor of Materia Medica and member of the Philadelphia Association of Congregational Ministers, was expelled from the Association.

On March 23, the Record reported the sale by constable of the equipment of the University. The "pickled babies" were sold for a total of four dollars, the wax models for $5.50, the wall cases for from $4.00 to $6.00 each, a skeleton for $2.50, the chairs and desk $14.00, and a bell, used to summon students from recess, for ten cents. The contents of the dissecting room included the skeleton of a horse, plaster casts of arms and legs, and a mixed collection of bones, but no cadavers. The sale price was $5.75. The proceeds of the entire medical school were about $95!

The Record ran an item on June 14, reporting testimony that the University had been selling its diplomas for a long time, including one for the degree of Doctor of Laws to a two year-old boy,[7] the price paid being $200. It told of Dr. Paine's having sold many medical diplomas of the University to persons who had attended few or no lectures, and had taken no examinations nor presented

tion, sold $90,000 worth of diplomas. A certain Dr. Blood, who sold diplomas for Buchanan, told him that he had also sold one thousand diplomas for Paine.

[6] The Philadelphia Record published an article on June 18th, setting forth that Miller had passed checks which were returned, marked "no funds", and was suspected of having been involved in the intentional burning of a farm-house, for the purpose of collecting the fire-insurance upon it.

[7] J. Dunbar Fuigal Hylton, the nephew of J. Dunbar Hylton, M.D., Professor of Chemistry and Toxicology at the rival school—the Eclectic Medical College of Pennsylvania—American University of Philadelphia.

any theses. The University records showed the names of the persons who had purchased honorary degrees and the amounts which they paid.[8] The evidence had been gathered by a committee of the State Senate and had resulted in the repeal of the charter in 1872. The newspaper item also raised another interesting point. It will be recalled that the American College of Medicine in Pennsylvania had been chartered in 1853 and had run for but one term and had then ceased to operate. In 1860 Paine and McClintock revived this school by means of an amendment to its charter, and thus established the American College of Medicine in Pennsylvania and the Eclectic Medical College of Philadelphia. The State law required an enrollment tax of ten dollars, but the school had not paid it. By a law passed in 1856, all acts of Assembly heretofore passed, in which an enrollment tax was required by act of April 16, 1845, were repealed, except those on which the enrollment tax shall have been paid within one year of date. Therefore, by 1857, no such tax having been paid, the charter of the American College of Medicine was no longer valid and could not be revived, in consequence of which it could not be restored to life by changing its name. Since, however, the new college had indeed been enrolled, in 1860, if it had legal standing it must date from that year, which would bring it within the power of the repeal act of 1857. Therefore Paine could not claim the same immunity from repeal which Buchanan had won[9] and therefore Paine's failure to take his case to the courts resulted in the repeal of his charter. The Record reported that Attorney General Palmer reasoned that consequently all diplomas of the Philadelphia University of Medicine and Surgery issued after 1872 were useless. As to the Quaker City Business College, its charter was subject to legislative repeal and the Attorney General recommended that course of action.

On June 14, 1880,[10] J. Howard Gendell,

[8] Daniel L. Flemming paid $30 for an honorary degree. Dr. O'Callihan paid $5.00 for a degree. James McShane, janitor at the College, said he had been offered diplomas for sale, as had R. T. Hylton, brother of J. D. Hylton. The University office records showed sales of honorary degrees for $15, $30, $75, $85, $300, etc., etc. The Philadelphia Record claimed it had received a letter from one recipient of an honorary degree, expressing indignation that the University had attempted 'to burden him' with this 'distinction.' Apparently other persons felt the same way about ad eundem degrees offered them, and refused acceptance.

[9] On the basis that the repeal act would not apply to charters already granted earlier.

[10] The next day the Record printed a letter from Dr. William H. Iszard, of Camden, N. J., endorsing the exposé of the "fraudulent doctor shops." Regarding them as "a curse of our profession," he said that he purchased one of Paine's diplomas for $50, without seeing "all of their professors, or (attending) but one or two lectures." The newspaper also re-printed the editorial comment of the five New York and Pennsylvania newspapers which are here partially reproduced:
New York Times. (on Buchanan)

"For fifteen years a nest of criminals has existed in the city of Philadelphia, and has carried on its work with such bold publicity that the whole world has known of its doings. Its practices have caused more suffering than can be estimated, and a long list of murders may justly be charged to it. The Legislature of Pennsylvania tried to break it up eight years ago, but failed. It has been repeatedly declared that these criminals were operating under charters granted by the State, and were safe from prosecution. At a time when the infamy of their operations was a matter of common knowledge the Attorney General declared that he had no evidence against them, and no money to begin procedings. Is it not a stinging satire upon the great State of Pennsylvania and its chief law officer that this nest has at length been broken up at the instigation and through the efforts of a newspaper, upon evidence collected by a member of its city staff, and with funds advanced by it to the State? The newspapers of Philadelphia are sometimes called "sleepy" by their unkind or thoughtless contemporaries in other cities. THE PHILADELPHIA RECORD, at least, shows that it was wide awake while Attorney General Palmer and his subordinate officers have been asleep, fast asleep. Buchanan and his fellow-vampires have gone on for years fostering quackery and fattening on its profits, all the time advertising their sham "medical colleges" and sending their bogus diplomas into every State in the Union, and in Germany, England, France, Cuba, Mexico and South America. They have trafficked in human life, and the white headstones of innumerable graves are the record of their business success. Upon the base semblance of authority conferred by them thousands of ignorant and unprincipled men have assumed the grave responsibilities and sacred trusts of the family physician, and under false colors have waged

Esq. obtained from Judge Ludlow, in Common Pleas Court Number 3, a writ commanding Ingraham and colleagues to show by what authority they exercised the franchise of the Philadelphia University of Medicine and Surgery. On June 28 Ingraham, Miller, Hargraves, and Kaye replied to the quo warranto by saying that the Trustees of the Philadelphia University of Medicine and Surgery had adopted a resolution on November 24, 1866, jointly with the Trustees of the Penn Medical University, that they collectively should henceforth be Trustees of the Philadelphia University of Medicine and Surgery. On November 28, 1868 the University had resolved to make the Quaker City Business College its Department of Arts. The Trustees were therefore now only exercising the rights conferred by acts of Assembly.

On July 30th the following response was made on behalf of the Attorney General: The defendants were not mentioned in the acts of Assembly, nor do they now show that they have succeeded to the rights of the original incorporators, nor that they are in any way entitled to these rights. Further, the defendants are trustees, but the act conferred the rights upon the corporators, nor do they show who elected them trustees. In addition they do not show legal cause for consolidating three corporations into one body under one name, exercising powers conferred by charters of other corporations, and thus they have forfeited any rights which they may have had by virtue of the charter of the Philadelphia University of Medicine and Surgery. The rest of the argument consisted of the legal elements dealing with the enrollment tax and charter-repeal, which have been discussed above, making all diplomas issued since 1872 useless. The charges were made that diplomas were conferred upon persons who had not attended two full courses of lectures, had not completed a course of study of not less than three years and shown the requisite moral and literary qualifications for the same. Not only had the school exercised powers under the consolidated charters of three schools which it had no legal right to do, but it had also been acting beyond its legal right in granting such

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an unequal battle with disease. A doctor of medicine may very easily conceal the scantiness of his attainments from his patients. A diploma is everywhere accepted as evidence that its holder possesses the full measure of knowledge and competence, and with the vast majority of people one diploma is as good as another. They know nothing of the comparative standing of our schools of medicine, and to their understanding the "American University of Philadelphia" or the "Eclectic Medical College of Pennsylvania" is quite as impressive and dignified as the names of more legitimate institutions. The patient is slow, too, to suspect that he is the victim of an impostor. He attributes his loss of limb or impairment of faculty to the virulence of his malady, rather than to the bungling of his doctor. And when the charlatan brings death into the house the mourning friends console themselves with the thought that the "dear doctor did everything he could".

Sunbury (Pa.) Daily

". . . Buchanan . . . has been the president for some years of five or six mythical medical institutions, selling diplomas . . . Too much credit cannot be bestowed upon THE RECORD for starting this movement (at its own expense) . . . especially after the powers that be failed for years to do their duty in the matter."

New Haven Register (on Paine)

"It has long been a disgrace to Philadelphia that mushroom medical colleges were allowed to issue bogus diplomas. . . . the offenders have been unearthed and brought before the Courts, where they will be severely punished. . . . the "Philadelphia University of Medicine and Surgery", the chief fountain whence flowed a foul stream of bogus diplomas—price, $10 each—may be considered as defunct."

Chester (Pa.) Times (on Paine)

"THE PHILADELPHIA RECORD this morning publishes a list of the "graduates" of Paine' Doctor Factory. There are some names uncomfortably near this city, whose owners' cheeks will tingle when they see their names in print. THE RECORD is doing a good work, and should not stop until every root and branch of such like frauds are driven out of Philadelphia".

New York Commercial Advertiser (on Buchanan)

". . . the bogus medical diploma business seems to have been carried on with . . . boldness and shrewdness. The system was as nearly perfect as it was possible to make it. . . . Europe as well as the United States was flooded with the spurious parchments which gave our diplomatic representatives a good deal of trouble at times when suspicions were aroused. . . . the city is at last freed from a stigma which has disgraced it for many years."

degrees as Graduate in Pharmacy, Bachelor of Arts, Master of Arts, and Doctor of Divinity. The charges were also made that it had done the many things which have been discussed in the pages above. In reply to the many criticisms leveled against it, the Faculty and Trustees now circulated a pamphlet purporting to be "An Exposure of the Conspiracies against the Philadelphia University of Medicine and Surgery and the Gross Slanders Refuted," in which the whitewash was liberally applied to themselves and the University.

Miller was arrested on August 1, 1880, on charges of forgery, in connection with the certificate of scholarship which he handed to John Norris (upon payment of $25), signing the name of W. J. P. Ingraham thereto, as well as the names of Hargraves, Kaye, and Wooster to the lecture tickets. In magistrate's court, Ingraham testified that although he had not formally authorized Miller to sign his name, it was not a forgery, but he added that Miller had no right to sign the course tickets, that being a prerogative of the Professors. Miller was released upon posting $2000 bail.

The last days of the Eclectic Medical College of Pennsylvania—American University of Philadelphia are equally interesting. On June 9, 1880 a Special Postal Agent, the city's Chief of Police, a Deputy Marshall, a Philadelphia Record staffer and six police officers gathered at the corner of Fifth and Pine Streets. At three o'clock a letter-carrier delivered some mail, including two registered letters, to John Buchanan, Dean. The ten persons listed above immediately swarmed up the stairs and into the room where Buchanan was performing a dental operation upon a patient. The postal agent examined Buchanan's freshly delivered mail, then organized a search of the building. Buchanan's private office yielded nearly half a ton of blank diplomas, some already signed by the faculty and ready for the insertion of the purchaser's name. A table-drawer was found to be full of seals, and on the floor rested the plates for printing the diplomas of the two schools. A mass of letters relating to the sale of bogus diplomas, among which were letters sent to Buchanan by the Record, and a huge pile of express receipts, showing that at least 3000 diplomas had been sold in the last six years, were also found, while Buchanan looked on, unperturbed. Among the evidence was a circular to country editors offering a perpetual scholarship in the American University of Philadelphia, in payment for an advertisement for a stated period of time. After the lengthy task of gathering all the documents was completed, the Record staffer packed them off, in a hack, to the United States Court, at Fifth and Liberty Streets. Buchanan, in the custody of the Deputy Marshall, was brought before United States Commissioner Gibbons, who was awaiting him at the court-house, and the hearing began immediately. Assistant United States District Attorney Brown charged the prisoner with scheming to use the United States Mails to defraud, and remarked that it was one of the most important cases ever brought into that court. Buchanan, by now extremely nervous, was held in $5000 bail. Failing to obtain bail, he was lodged overnight in Moyamensing Prison. Meanwhile a round-up of the Faculty was begun. Charles G. Polk, M.D., Professor of Surgery and the Institutes of Medicine, was arrested at his home. He stated in magistrate's court that his signature on the diplomas was a forgery, that he never signed a diploma in blank, and that he was willing to testify against Buchanan. He further stated that he had not been a member of the Faculty since 1876, except for a series of lectures which he had given each winter (because he was in economic need), that James Cochrane, M.D., Professor of Anatomy and Physiology, was in Texas, Richard Forbes, M.D., Professor of Medical Jurisprudence, was unknown to him, as were three other members of the Faculty, that J. C. Waters, M.D., Professor of Materia Medica, was dead, P. A. Bissell, LL.D., lived in Mahanoy City, Pa., and that C. H. Kenroth, Professor of Chemistry and Toxicology, lived in Elwood, N. J. J. J.

Siggins, Demonstrator of Anatomy, was also taken into custody and stoutly denied any complicity with the frauds of the diploma mill.

The police action described above was the result of the widely-felt need of stamping out the bogus schools of Philadelphia.[11] (The complaints, from abroad, of the sale of bogus diplomas have already been discussed in number five of this series.) State Attorney General Palmer said that he lacked the necessary evidence and funds to take action. Philadelphia's physicians showed no signs of taking any vigorous and prompt steps. The Record therefore offered the Attorney General whatever assistance would be required, and listed five schools to be attacked:

1) Eclectic Medical College of Pennsylvania (Buchanan)
2) American University of Philadelphia (Buchanan)
3) Philadelphia University of Medicine and Surgery (Miller)
4) Quaker City Business College (Miller)
5) Philadelphia Electropathic Institution, 1230 Walnut St. (Galloway and Bolles)

The inquiry was to be five-pronged—charters, grounds of forfeiture, modes of procedure, laws relating to the practice of medicine and the granting of diplomas, and, finally, criminal liability. The grounds of forfeiture were to be based upon 1) the sale of diplomas, 2) their issuance to incompetent persons, and 3) the insufficiency of instruction, due to the lack of facilities and the incompetency of the professors. Six weeks were devoted to gathering evidence to sustain the three charges which would be brought as a basis for demanding forfeiture. (In pursuit of this evidence a member of the Record staff spent $225, for which he obtained:

One diploma (M.D.) from the Eclectic Medical College of Pennsylvania

Two diplomas (M.D.) from the American University of Philadelphia

One diploma (M.D.) from the Livingstone University of America (Buchanan)

One diploma (M.D.) from the National Eclectic Medical Association

One degree of D.D. from the Livingstone University

One degree of LL.D. from the American University of Philadelphia

One degree of D.C.L. from the Livingstone University.)

Truth about Buchanan began to come out. Sometime around 1850 he had been a porter in an Arch Street store. Suddenly he left and reappeared as a professor in the Eclectic Medical College of Pennsylvania. The split in that school brought him to the front. By the time the school was removed to its Pine Street location he was ready openly to advertise and sell diplomas. He obtained the 1867 charter for the American University of Philadelphia, empowering it to give all manner of degrees, and boldly set about extending his trade, by which he soon flooded the country with his diplomas. By 1869, now a candidate for office in the Fifth Ward, he recklessly distributed free diplomas among the colored voters, in order to win their support. Eventually a State Senate committee investigated the diploma mess and reported that Buchanan was selling his diplomas openly and systematically. Regular and fully-signed diplomas were being granted to women who could not even tell the location of the College, and there was abundant evidence that persons were purchasing degrees without ever having attended any of the lectures or having received any instruction whatever. One of the professors of the college admitted that, while he held an important chair at the college, he visited a distant part of the State in order to find out which of the practicing physicians in that locality were without diplomas, in order that he might offer to sell them medical degrees "for whatever sum could be obtained."

[11] This feeling was given impetus by the fact that a Philadelphia printer had been declared sane by a lunacy commission, after certain physicians had signed a certificate committing him to an asylum. (The printer sued for $20,000 damages.) Public feeling ran high, and thus there developed a demand for higher standards of medical practice. Out of this wide-spread attitude resulted the trap to catch Miller and close down the Bogus Medical Schools of Philadelphia.

The Senate committee recommended repeal of the charter of the Eclectic Medical College (Buchanan) and the Philadelphia University of Medicine and Surgery (Paine), but the committee bungled the job by overlooking Buchanan's second charter—that of the American University of Philadelphia. Then Provost Stillé, of the University of Pennsylvania, further confounded things by misquoting the laws relating to the charters, thus confusing Paine with Buchanan, an error further compounded when the Legislature quoted Stillé in the mistaken notion that he was correct. We have seen that the Legislature attempted to repeal Buchanan's charter for the Eclectic Medical College and how it ended in victory for Buchanan, due to Judge Agnew's ruling that the charter, having been granted before the power to repeal was given to the Legislature, the only way to annul the charter would be by judicial, not legislative, proceedings. The comedy resided in the fact that the Legislature had repealed what it had no right to repeal, while ignoring Buchanan's second charter, that for the American University of Philadelphia, chartered in 1867, and therefore, indeed, subject to the repealer act of 1857, to which resort should have been made. Flushed with victory, Buchanan widened his activities —abroad he established the following agencies in London: C. J. Sayer (address not available), E. Sturman, of 70 Seven Sisters Road, Holloway N., D. and H. Howard of 31 Oxford St., and P. F. A. Van der Vyver, alias "Medicus." He also established the completely mythical Livingstone University of America, variously of Camden and Haddonfield, N. J., and Charleston, West Virginia, boasting nineteen professors in the Faculties of Arts, Laws, and Medicine. Circulars were broadcast all over Europe and America. Nor did he stop there, for he also "established" the University College of Pharmacy and the National Eclectic Medical Association, the latter for holding examinations and granting diplomas.

Buchanan advertised widely in Germany—*Ecclesiastical Gazette* (1871), *Cologne Gazette* (1880), *Internationale Ausstellungs-Zeitung* (Vienna), *Hamburger Fremden Blatt*, *Hamburger Nachrichten*, etc., etc.—and in such other papers as *Bermuda Royal Gazette* (1877), *La Gazetta de Venezia* (1877), *London Standard* (1878), *Boston Herald* (1877). In the last named paper he boldly offered degrees of M.D., D.D.S., PH.D., M.A., B.A., and LL.D. to doctors, dentists, chemists, artists, clergymen, and others. Eventually the bogus diploma trade became widespread in most of our States. In Illinois there was such alarm at the spread of bogus diplomas that it was found necessary to pass a law requiring all physicians to submit evidence of their qualifications to a Board of Examiners, which found that out of the six thousand doctors, four hundred were unfit. We have already mentioned the report (in number five of this series) of Mr. White, our diplomatic representive in Berlin. In London[12] Mr. Schenck felt obliged to use the British press to caution Englishmen against the purchase of bogus American medical diplomas, and in 1874 Cousul A. M. Hancock, at Barcelona, denounced Van der Vyver, Buchanan's principal agent abroad, as an impostor, and his wares as forgeries. Every steamer brought Buchanan a batch of foreign money-orders. Before long he was indicted in Quarter Sessions Court for "indecent advertisements," but fled to Europe, taking along another box of fraudulent diplomas for sale. His agents managed to steal the indictment from the records of Quarter Sessions Court, whereupon he boldly returned to America and promptly ran afoul of the law once more, but for some unexplained reason the District Attorney did not press charges against him. One of the devices by which he escaped apprehension by the law was the assumption of a bogus name, "Rev.

[12] Sturman not only acted as his agent there, but offered him some diplomas in English, and some in Latin, for sale. A letter sent by him to Buchanan, in 1878, was so bulky that it was suspected by the postal authorities of containing foreign lace, which the sender was trying to smuggle into the country, a common "stunt" at the time. When opened by Customs Officials it was found to contain a bundle of labels, and a letter about the sale of 500 diplomas of a St. Louis college.

James Murray." Under that name he received mail from all parts of the world, addressed to Box 15, Haddonfield, N. J. or to Livingstone University at the same address. He did not call in person for his mail, but sent his hirelings instead. This trick worked, and Buchanan was safe from trouble with the law for a while, until the suspicious and alert postmaster at Camden refused payment of one of Buchanan's money-orders, on a technicality. In September 1874 he was arrested for performing a fatal abortion, and in April, 1876, for "printing and publishing circulars advertising the cure of sexual and genito-urinary diseases." In September, 1876, he was arrested for a third time, the charge being that of selling academic degrees. The records show that no bill of indictment was prepared against him for the September, 1874, arrest. Almost all the records in connection with the other two arrests are missing—bills of indictment, bail bonds, bail forfeiture, etc. He must have had a confederate in the office of the Quarter Sessions Court. Other opportunities to bring him to book arose, but each time the law took no action against him. Typical of such failure by some of the authorities is the episode of the arrest of six witnesses desired by the Attorney General. Six years after a detective reported that he could not find any of the witnesses, a Record-staffer undertook to locate them, and, in three hours, accomplished the task.

Another dodge is worthy of recording. Frederick Wilhelm Kordenat began practicing medicine in Honesdale, Wayne County, Pa. He did such appallingly poor medical work that nearby physicians soon had to demand his arrest, as a result of which he was convicted in September, 1877. He begged time to obtain his certificate of graduation from Konigsberg University. What he then actually did was to try to obtain a forged diploma from Konigsberg University's janitor. Failing in that, he tried to purchase the diploma of a dead New York physician, from which he hoped to erase the name, then insert his own. Again he failed, and now, armed with a note from a Lutheran minister, he came to Philadelphia, and after a little interchange with a local druggist, arranged with the latter to purchase for him two diplomas of the American University of Philadelphia. The deal also included a certificate which stated that Kordenat was a graduate of various medical universities in Germany and was a military surgeon of great eminence, had taken all the lectures (which it listed in detail) required by law, had passed a highly meritorious examination, and written a thesis on gunshot wounds, in consequence of which the degree of doctor of medicine was conferred upon him on December 10, 1877. The certificate was signed by Buchanan. Kordenat presented it to the District Attorney at Wayne County, but the latter was suspicious and undertook an investigation. The druggist, having been cheated out of the remuneration promised for his assistance, told all. The matter was placed before the Philadelphia District Attorney, but no action was taken for an entire year, after which criminal proceedings were barred by the statute of limitations, says the Philadelphia Record of June 10, 1880. For the eighth time Buchanan had thus slipped through the hands of the law. The Wayne County District Attorney, the Honorable P. P. Smith, now proceeded on his own, but after spending much time, effort, and hundreds of dollars of his own money, he became disgusted with the sluggish officials and dropped the case. A Record staff-member looked through the records of the Attorney General but could find no trace of the correspondence dealing with the case. One may well ask what became of all this evidence against John Buchanan? The University of Pennsylvania, one of the chief victims of the bogus diploma trade, had ample evidence against Buchanan but felt it better to take no measures against him.

To trap a man of Buchanan's slipperiness would require sharp wits. The trick was turned by the same John Norris who had helped to trap Miller, in cooperation with Special Postal Agent Charles B. Barrett, one of the ten men who later took part in Buchanan's arrest (on June 10th). Norris set himself up in medical

practice as Dr. J. William Fanning at Tippecanoe City, Ohio, and was cheerfully joined by Barrett, who jumped at the chance to help trap Buchanan. "Fanning" had stationery printed for him, on the reverse side of which appeared the following:

DR. FANNING'S GREAT REMEDIES.

DR. J. WILLIAM FANNING'S LUNG MIXTURE AND BLOOD PURIFIER.

FANNING'S FEVER AND AGUE REMEDY.

Fanning's Lung Mixture and Blood Purifier drives out Disease, prevents the accumulation of Tubercle, tones the system and improves the digestion.

Thousands testify to its wonderful effects and life-sustaining powers.

Read a few of the many remarkable cures from the doctor's case book.

Case No. 1. Son of an eminent surgeon had contracted cold, which settled on lungs and caused decline. Trip to Europe and advice of German Universities failed to effect a change. The winter in Florida and a season in the rarefied atmosphere of Colorado's plateaus failed to cure. Tried Dr. Fanning's Lung Mixture and Blood Purifier, coupled with thorough hygienic treatment, and is today a brawny, vigorous man, a civil engineer in Chicago.

Case No. 2. The young and beautiful wife . . . (etc., etc.)

Chicago, March 27, 1879.—Dr. J. William Fanning—

Dear Sir. I would not take the wealth of Chicago for the great cure your medicines have made of me. I am as well as I ever was in my life.

Yours very gratefully,

Z. Scott,
Dearborn St.

If you feel depressed.

If your appetite is impaired.

. . . etc.

If you have any unnatural or curious sensations, communicate with Dr. J. William Fanning (etc., etc.)

The Tippecanoe Postmaster was brought into the plot. "Fanning" on May 10, 1880 wrote Buchanan a flattering letter about the latter's book, "The American Practice of Medicine," and said that he, Dr. Fanning, had been practicing medicine for two years, with remarkable success, but could elevate his standing if he had something to show that he was "not a mere dabster." He could write a thesis or make a three-weeks visit to Philadelphia, if required. He would pay for all risks incurred. He added that he had read about American Minister White at Berlin and the Volland diploma (in Latin) in the Dayton Journal. He wished his diploma to be in English. Buchanan replied, on May 18, that what he sold, contrary to what Mr. White had said, was a scholarship, and that once a person was a member of Buchanan's institution "the other matter can be arranged." All that was necessary was that "Fanning" send his full name, date desired on the diploma, a very short thesis, and at least $65. If not acceptable (i.e. if the thesis were not adequate) Buchanan would send Fanning "some books." Fanning accepted Buchanan's offer, sending, by return mail, a thesis on "Electricity as a Curative Agent," which reached Buchanan on May 25, 1880. The thesis was a resumé of the attitude of all the various "schools" of medicine toward the subject of electricity, to which were added several paragraphs taken from Buchanan's book, each citation being ostenatiously credited to that publication. He asked Buchanan to publish the thesis in his Journal if he thought the work meritorious. He also said that he would pay $100 if he could have both the certificate of scholarship and "other matter" (the cover-up term for diploma). But Buchanan had grown impatient, and, before receiving the offer of $100, had shipped three diplomas—one from the Eclectic Medical College, one from the American University of Philadelphia (in Latin), and one from the National Eclectic Medical Association, and two books: the Pharmacopoeia by Buchanan and Siggins, and Buchanan's "American Practice"—in a large wooden box, stamped "Columbia River Salmon" and marked "C.O.D., $50." As soon as he read "Fanning's" offer he rushed a person down to the Express office to telegraph the express agent at Tippecanoe to change the C.O.D. to $75. Fanning received the diplomas.

In order to make assurance doubly sure, another trap was set for Buchanan. Norris wrote to Buchanan, alias Rev. James Murray, D.D., at Haddonfield, signing himself "Dr. George A. Dawson, Chester Court House,

TO ALL MEN GREETING
Be it Known,
THAT THE PRESIDENT ON BEHALF OF THE TRUSTEES, AND WE, THE FACULTY OF THE
ECLECTIC MEDICAL COLLEGE OF PENNSYLVANIA,
Incorporated by an Act of General Assembly of the Commonwealth of
PENNSYLVANIA
Do hereby testify that
John William Fanning
Philadelphia

Fig. 1. The Fanning diploma. Reproduced from a photocopy in the Library of The College of Physicians of Philadelphia.

South Carolina." He requested information on diplomas for himself (M.D.) and his "brother" (D.D.) and hoped that he could "make a deal" cheaply—he offered $150 for both degrees. Buchanan replied in his own name, saying that the Rev. James Murray was in Europe and the Livingstone University in financial difficulty, but that he could arrange matters for Dawson—diplomas from the American University of Philadelphia or from Livingstone University could be had, but, first, a deposit of $10 to $50. Dawson sent $10. Buchanan acknowledged receiving the $10 and asked information as to the full names, dates and degrees desired, and asked for a quick reply, as he would be ready with four diplomas, one from each of the two "Universities" for each of the two brothers, for an additional payment of $140 (a total of $150).

Now it was decided by Norris to bring Buchanan clearly into violation of postal laws, and therefore "Dawson" replied that he wished the degrees of LL.D. and M.D. for himself, and PH.D. and D.D. for his "brother." The dates on the diplomas were to be from 1873 to 1879. He expressed his intention of sending $140 by money order, and requested Buchanan to notify him by post as to whether to expect the diplomas by post or by express. Buchanan then received and signed for a registered letter from Dawson at Chester Court House, South Carolina, containing $140 and a request to send the diplomas by post, as the matter was too delicate to trust to the local express agent, who was no "friend" of Dawson's. In return for the money Buchanan then sent, in a brown paper roll tightly sealed, three diplomas for Dawson and two for his "brother." Four of the five were signed in the same names as "Fanning's" and were from the American University of Philadelphia. The fifth diploma was from Livingstone University, and signed Henderson, Brown, Clark, Forbes, Robertson, and

White as faculty, with James Murray and George McDonald as officers. Now the trap had been sprung, with Buchanan safely inside it!

Other evidence was also accumulating—cases of persons who admitted purchasing bogus diplomas, of degrees conferred in absentia, of diplomas granted without requiring compliance with legal requirements, etc. Forty-two diplomas were known to have been sold at this point—eight to Norris, fourteen in Germany, three in England, four in Havana, eight in Pennsylvania, one in New York (to Madam Cleopatra Altoricum, Clairvoyant), etc. Most of the diplomas were sold by Buchanan himself, but he also had agents. His London agents have been named above. A Dr. Bettman sold diplomas for him in Germany, and G. W. Marriott, in Germantown, Philadelphia. Into the hands of the Record fell an immense number of letters from people who wished to purchase diplomas. Many of these were from abroad.

At the hearing before the United States Commissioner, on the day after Buchanan's arrest, Norris and Special Postal Agent Barrett gave testimony of their knowledge of the case. Mr. Barrett also told of finding a complete compositor's office and a printing machine in Buchanan's cellar. Receipts, diplomas, and much other evidence were exhibited in court. The letter-carrier who delivered registered letters to Buchanan and received signed recepits for them also testified. Buchanan was held under $10,000 bail for using the mails to defraud. Now the State Government entered the case, the charge being violation of the act prohibiting the signing of a diploma grant-

Fig. 2. The bogus diploma (Doctor of Laws) issued to "George Austin Dawson" by the American University of Philadelphia. Reproduced from a photocopy in the Library of The College of Physicians of Philadelphia.

ing an academic degree for "payment of a consideration." Bail for this misdemeanor was set at $3000. Buchanan was now under a total bail of $13,000. He returned to jail.

The Chief of Police, the United States Commissioner, a Board of Health inspector and three officers now went through the building of Buchanan's College. In the dissecting room they found, upon tables, one male and one female cadaver, horribly dissected, and four or five bodies, chopped up, in a large box. Stench, vermin, and dust were everywhere. Conditions were too revolting to describe, and it is better to spare the reader all the disgusting frightfulness which was discovered by the authorities. Other parts of the building were elegantly fitted out as a dental office, a medical museum (containing costly wax models), an extensively stocked drug store, and apparatus for printing advertisements, etc. The front office on the first floor was furnished in luxury and taste. In the center of the floor, covered by a piece of Brussels carpet, was a trap-door leading down a short flight of stairs to another part of the building. The Record quotes someone as having said that there were "more secret doors and means of exit in that building than anyone would dream of."

By July 3, 1880, Buchanan, now free on bail, faced charges of forgery, use of the mails to defraud, and sale of academic degrees, and his punishment could have amounted to forty-one years of imprisonment.

On July 7th, Charles H. Kenroth, Professor of Chemistry, whose basement office in the building at 514 Pine Street communicated, by carpet-concealed trap-door, with Buchanan's office, was taken into custody. He, like Buchanan, had signed "Fanning's" diplomas, the other signatures on the diplomas being forgeries. (When Buchanan's school was raided Kenroth fled to Atlantic City, where he remained for a few weeks, then returned in the mistaken notion that the storm had blown over.) He was allowed to finish his dinner, and then taken off to jail at Fifth and Chestnut Sts. The authorities were glad to have bagged him, for it was he who had forged three signatures on the Volland diploma, which had done so much to bring shame upon America in the eyes of persons abroad. (The other signatures on this diploma were the work of Buchanan.)

Dr. John H. Rauch, in a secretary's quarterly report to the Illinois Board of Health at this time, expressed gratification that the developments in Philadelphia sustained the action of his board, for it had never recognized the diploma of the Philadelphia University of Medicine and Surgery, the American University of Philadelphia, the Livingstone University, nor the late issues of the Eclectic Medical College of Pennsylvania. Dr. Rauch expressed the belief that some of the diplomas of the Philadelphia University of Medicine and Surgery might, indeed, have been obtained in good faith, but he had never been certain enough of them to recommend the issuing of certificates to their holders. Of an estimated 250 diplomas from the schools named above, held by persons practicing medicine in Illinois when the Medical Practice Act went into effect, only 160 were presented for certification, and of these, many of the owners left the State, while others entered reputable medical colleges and graduated. "As a rule, they (the diplomas of these schools) were held by the most ignorant quacks."

On July 17th, the Philadelphia Record estimated that there were fully 11,000 Buchanan diplomas current throughout the world. Of that number, 1500 names appeared in the College Journal as graduates[13] and these were reproduced in the Record of that date, which also published the names of persons who had submitted a thesis to Buchanan, for the purpose of obtaining public recognition of their standing as physicians. A very small proportion of the persons so listed were legitimate doctors. A third list published by the Record of the same date gave the names found in the

[13] Even the "Commencement Exercises" were bogus. On June 9 the raid netted a Buchanan "report" on the exercises which were alleged to have taken place on June 25, complete with the name of the clergyman who had opened the exercises with prayer.

sixteen receipt-books captured in the Buchanan raid. Of 600 names of persons in this list, over 500 probably purchased diplomas, the others being buyers of false teeth, drugs, etc. Buchanan padded the list of graduates with names from the other two lists, in order to make the college enrollment seem very large. For example, for the year 1880, there were but thirty students in attendance at his college, but he published a list of one hundred and five names. There is strong reason to believe that he sold a great many diplomas in Europe. All of his diplomas of Doctor of Dental Surgery and of Graduate in Pharmacy are bogus, as his schools never had the power to confer these degrees.

The following methods of detecting a fradulent diploma, promised in an earlier article in this series, are to be noted:

1) the name should be in the list of graduates at the end of this article. If it is not, the diploma is bogus. If it is in the list, the signatures on the diploma should be those of the professors who were on the Faculty on the date that the diploma was issued. Such a list of Faculty members, by session, is given in the article on Buchanan's school (number five in this series).

2) J. J. Siggins said that any diploma bearing his name was a fraud.

3) David Diller said that any diploma dated after 1876 was a fraud. The same is true of James Cochran, after 1878; likewise for R. A. Simpson.

4) All diplomas signed by F. C. Waters, Richard Forbes, and James Robinson should be held suspect, as these persons were unknown to the rest of the Faculty and were probably mythical.

5) Any diploma dated after 1863 without the name of John Buchanan is fraudulent, as he is believed to have signed all diplomas after that date.

6) Any diploma earlier than 1879 signed by C. H. Kenroth should be held suspect.

7) All diplomas from Livingstone University, or any in dentistry, laws, or pharmacy from the American University of Philadelphia or any dated prior to 1868, are fraudulent.

8) Diplomas signed Philip A. Bissell, after 1870, or John J. Fullmer, before 1878, are fraudulent.

9) All diplomas of the National Eclectic Medical Association are fraudulent, if signed by John Buchanan.

10) All notarial certificates signed by Philip A. Cregar should be held suspect.

Many of the captured letters were very interesting. The Philadelphia Record for July 17 gave excerpts from fifty-four of them, many from England and Germany but most of them from the far-flung States of our country. Many of the letters showed consummate gall. A listing of some of the remaining evidence seized, very damning indeed, ran to 16 newspaper-column inches in length. One letter may still draw a little laughter. It was in the form of a bill for "sixty on parch. $8." from the lithographers. In other words, a sheepskin cost about thirteen cents to produce—more than it was worth! Also good for a chuckle is the captured diploma of the American University, to which is attached a notarial certificate, signed by Philip A. Cregar, certifying that the signatures were genuine and written in his presence, and opposite to that, another certificate by a New York notary, stating that the prothonotary's signature was genuine, although no such signature even appeared on the document!

No sooner was Buchanan out of jail than he was again trapped plying his trade in diplomas! On August 5th his son's home was visited by police, who attached three diplomas five minutes after being delivered there. The raid also brought to light a steel plate for the diplomas of the American University, and two hundred blank diplomas. Presumably this plate was a replacement for the one captured earlier, and was used to print the two hundred new diplomas.

On July 30, 1880, Secretary of State William M. Evarts wrote from Washington to Pennsylvania Governor H. M. Hoyt, urging him to take steps to prevent further damage to Ameri-

can medical institutions such as had been done by the sale abroad of fraudulent diplomas from the American University of Philadelphia. Mr. Evarts enclosed a copy of the dispatch sent by Frederick H. Schenck, United States Consul at Barcelona, to John Hay, Assistant Secretary of State, in which he told of his experiences with the bogus diploma traffickers in Spain; Mr. Schenck enclosed a bogus diploma from the American University, a certificate and an affidavit of the person in whose favor it was drawn. (He expressed the hope that the evidence which he was sending would help stamp out the crime.) The affidavit set forth the fact that the purchaser of the diploma had paid $300 to Van der Vyver, through an intermediary, for a diploma of the American University, signed by Buchanan, and that he had never resided in the United States, nor attended the said university.

The Record for August 14th prints a story of a Dr. David Wright, whose diploma was probably one of those distributed gratis by Buchanan during his political campaign in 1870, when he tried to snare the Negro vote. Wright filled out a certificate of death in such an illegible manner that the matter was brought before Dr. Leidy, acting medical inspector. The declared cause of death was "Collary fantum" (Cholera infantum). Dr. Ford, chairman of the Sanitary Committee, said, at its meeting later, that Wright was incompetent and dangerous, and the case was referred to the Coroner. A Record reporter describes the squalor, filth and poverty amidst which the doctor lived. His bed consisted of a mattress placed upon three chairs. The room was damp, mouldy and sunless. The furniture consisted of a small table with a few books, and there were a worn desk, two chairs, a small stove in the corner, and a grease-covered carpet on the floor. His prescriptions were as illegible as his certificate for "Collary fantum," and only one pharmacist had learned to decipher them—"two ounces of cough mixture," for a person with a cough, or "two ounces of rheumatic cure" for a case of rheumatism, read the hieroglyphics.

The last phase of the Buchanan story grows dramatic. On August 17th the news was that he threw off his coat and jumped into the Delaware River from a Philadelphia-Camden ferry boat, shortly after one a.m., in the full light of a bright moon. Only the coat was recovered. That the person who had jumped was Buchanan was attested to by a companion and by the ferry-boat engineer, who also knew him and had seen him aboard. Two days later the story was out that Thomas Coyle, the noted swimmer, had been offered fifty dollars some days earlier by an acquaintance if he would pad out his waist-line, put on a pair of short side-whiskers and leap from a Philadelphia-Camden ferry boat. After agreeing to the proposition he began to suspect a plot to murder someone, whereupon he reported the entire matter to the Mayor of Chester and the Chief of Police.

Three days later[14] the ferry-boat engineer reported that when Buchanan had greeted him aboard the boat the doctor had said "Good evening" and had shaken hands in a quite ordinary way, but now he recalled that Buchanan's voice had sounded hoarse and his hand had felt rough and hard. (The real Buchanan's voice was mild and his hands as soft as a lady's.)

On August 23, a certain Alfred Vrian signed an affiadavit stating that Buchanan's brother-in-law had offered him fifty dollars if he would impersonate Buchanan, and jump from a ferry-boat into the river. This was even better than the account given by Thomas Coyle, since it clearly identified Buchanan by name.

The Buchanan case was, by now, being so widely discussed that it even led to a melee in a "bistro," in which one of Chester's well-known residents had two ribs fractured. Buchanan was reportedly seen in Pittsburgh, but that story was investigated and denied by the news-

[14] In the meantime, Philip A. Bissell, one of Buchanan's professors, whose name appeared on many bogus diplomas, was arrested in Mahonoy City and brought to Philadelphia for trial, for sending an unsealed, obscene, and scurrilous letter to John Norris. He was held in $3000 bail.

paper "Dispatch." Then a friend of his recognized him in Detroit,[15] despite his shorn hair and beard, and promised not to disclose the fact that he had seen Buchanan, but "let the cat out of the bag" anyway. He now fled to Windsor, Canada, with his "wife", and, as "Mr. and Mrs. Robert McGregor", stayed at the International Hotel. The "wife", also bogus, was nineteen-year-old Norah Leonard, a Philadelphian, who received a telegram to join Buchanan in Detroit.

By August 25 it was considered a virtual certainty that a number of persons, both relatives and friends, had played various rôles in plotting and carrying out the suicide ruse. In the rush of news about the suicide and the stories as to where Buchanan had hidden before the drowning hoax was perpetrated, a story was told by his favorite bar-tender, who quoted him as having boasted, while awaiting trial, that he would "fool the Yankees yet." "We 'gillies,' as they call us from over the sea, can outwit the boasted wisdom of the people here."

By tracking Norah Leonard, John Norris located Buchanan in Courtright, Canada, where he was awaiting the arrival of funds. A Norris-inspired telegram, directing him to cross the St. Clair River to St. Clair, Michigan, where a sum of money awaited him, duped him into re-entering the United States and into the arms of Norris and a detective from the office of the District Attorney of Philadelphia. (Bogus to the last, Buchanan, short of money, had tried to hold a spiritual seance, as "J. Foster, world renowned medium" before a house of five hundred persons in London, Canada, but his nerve finally failed him, and, after mumbling a few words to the group, he fled to Sarnia, Canada. Shortly thereafter he went to Courtright, and thence into the trap which awaited him across the river, in Michigan.) He returned, in the custody of his two captors, to Philadelphia and was lodged in Moyamensing Prison. The bail was declared forfeited. (Even his arrival at West Philadelphia Station was not uneventful, for a gang had been hired to make a rescue attempt, but their serious and deep devotion to the flowing bottle before the train arrival left them in no condition to cope with the police and detectives strategically placed for such a contingency.)

Before the curtain goes down on our little play we must allow Buchanan his swan song: he now promised to do all he could to "right the wrongs" which he had committed, and to "tell all." He surrendered all his records—matriculation books, minutes of Faculty and of Trustees, account books, alumni books, lists of foreign diplomas sold, a catalogue of 5000 names of persons who had corresponded with him, names of wholesale druggists in Philadelphia who sold his diplomas, and names of persons who bought them. He told of "three professors [who] for five dollars each signed 500 diplomas for him, and how, for $3.50, the diplomas which were to go abroad were certified to by a Spanish Consul." The disclosure involved 10,000 names. He revealed the names of many professional abortionists and their tricks. He gave information about the advertised nostrums of the quacks, of a Philadelphia "fortune teller who reads destiny under the light of candles made of human fat," of a doctor who went to Europe annually and brought back love-powders which he claimed were compounded at the shrine of Cupid, in Minerva's temple. He admitted robbing graves, and as many as five bodies from Blockley Almshouse on one Saturday morning. He said that twenty-five concerns in this country and in Europe were selling degrees, and estimated that 20,000 bogus diplomas are current in America and 40,000 in Europe. He told the authorities how they could uproot every diploma-dealer in America.[16]

[15] In Detroit Buchanan sold more diplomas. The Detroit newsmen, finding out his hiding place, made the situation too warm for him, and he had to flee again.

[16] He explained how he made the "suicide" come off. On the night of his alleged leap into the river he met the man who was to impersonate him, gave him his coat, and drove off in a carriage. "As the ferry-boat turned to enter the canal separating Ridgeway Park from Wind-

He blamed Professors Sites and Hollembaek for having gotten him into the diploma business. He said that it dated from 1853, and had continued until about October, 1880. The Faculty were aware of the goings-on, and approved. (The minute-books even show that Hollembaek was directed to communicate with a Canadian buyer in 1863.) He told of "paying" fifty dollars to thirteen members of the Education Committee of the State Legislature, in 1871, and three thousand dollars to the Legislative investigating committee in 1872 "to protect the College from Legislative interference." He told of obtaining the charter for the American University of Philadelphia in 1867, of opening this as a school for colored medical students, at Tenth and Chestnut Sts., named its first Faculty as consisting of Professors Clark, Hutchins, Parden, Terry, Roberts, Cochran, and himself, and said that it had a student body of thirty-six. Two full lecture courses were given. Then, in 1870, every graduate of the Eclectic Medical College of Pennsylvania received not only its diploma, but that of the American University and the National Eclectic Medical Association, as well. The records of these early years of the American University were destroyed when its president was burned to death in the great Chicago fire. The diploma of the Livingstone University of West Virginia was patterned after Buchanan's own, that of Glasgow. He told of bogus degrees in dentistry and in pharmacy, the former sold in some quantity in Canada and in England. He quoted Alexander Wilder, author, and secretary of the National Eclectic Medical Association, as having said that both genuine and spurious degrees had been sold in our country for more than half a century, and having also expressed doubt "whether five colleges exist (in this country) free from taint or imputation." He revealed information on Druid University, Trall's Water-Cure College, St. Louis Eclectic, American Eclectic of Cincinnati, Eclectic of Georgia, Michigan Eclectic (whose H. S. Thomas was said to be prepared to swear that Buchanan was not Buchanan, but Thomas' father, if he had been captured in Detroit). He said that two-thirds of the physicians of Detroit "hold bought diplomas." According to him, the Scotch ministers "take to these University degrees like a set of hungry wolves. They will not investigate. They have the degree mania badly. Fully 20,000 diplomas of this University [the Antropological University of St. Louis] have been sold in Europe to ministers, doctors, and teachers." (The latter was the theological branch of Buchanan's American University.) His London agent, Van der Vyver, sold titles of Count, Countess, Duke, etc. Buchanan himself wrote a thesis for a clergyman of New York State who got his degree, then repaid Buchanan by drawing up the wording on Buchanan's Latin diplomas. ("Edinburgh in 1845 publicly advertised that it would sell one thousand diplomas at $50 each," etc., etc., said Buchanan.) He said that every school in Germany did it freely and openly for about fifteen years.

As a result of the Record exposé, the charters of the Eclectic Medical College of Pennsylvania, American University of Philadelphia, the Philadelphia University of Medicine and Surgery, and Livingstone University of America were annulled, in late 1880, and laws framed for protection of people from incompetent practitioners. At last Philadelphia was free of this horror.[17]

mill Island a skiff crossed its bow and lay close in under the shadow of the piles that jut out from the point of the island." The leaper let out a few piercing cries of despair for the benefit of the onlookers, then took about ten swimming-strokes in the water, which brought him to the skiff. Clutching lightly to the stern he was hauled down-river for a short distance, then clambered aboard and was rowed along the Jersey side, to Cooper's Point, and from there across to the Pennsylvania side, which placed him near his home in Kensington. Aboard the ferry-boat, during all of this, Vanduser, Buchanan's companion on the "fatal trip," raved like a maniac in beautifully portrayed, but purely synthetic grief.

[17] ". . . information . . . on legal actions against Drs. Buchanan and Miller is in the custody of the office of the Clerk of Quarter Sessions Court. Our search of that Court's docket has revealed that indictments were handed down against one John Buchanan (not specified as M.D.) in June of 1880 on a charge of making an illegal instrument and that he was found not guilty.

List of Buchanan's Graduates

Abil, Jacob W., '66 Pa.
Abrams, S. R., '70 N. Y.
Acker Eli, '71 Conn.
Ada(i)re, G. T., '69 ——
Adams, Eli Q., '68 ——
Adams, H., '63 Canada
Adams, H'y O., '58 Mass.
Adams, W. L., '74 Ore.
Adamson, J. B., '68 ——
Airey, Thomas, '63 England
Albright, Abram, '65 Pa.
Alcott, Ralph W., '78 Conn.
Aldrich, E. W., '72 Cal.
Aldrich, E. W., '77 N. H.
Alexander, J., '77 Mich.
Allen, B. B., '76 Cal.
Allen, C. B., '71 N. J.
Allen, Henry, '73 Ohio
Allen, J. B., '73 Conn.
Allen, Warren, '78 N. Y.
Amos, H. C., '77 Tenn.
Anderson, L. L., '76 Ga.
Anderson, Samuel, '66 Me.
Andrews, Edwin E., '58 N. Y.
Anholm, A., '76 England
Appley, J. D., '77 N. Y.
Arcond, A. D., '76 Ill.
Armstrong, William, '63 ——
Armstrong, William, '78 Pa.
Arnold, T. T., '77 N. Y.
Ashburn, Smith, '69 ——
Ashir, J. L., '69 ——
Assonville, V. D., '76 Cal.
Atkinson, W. J., '72 Mo.
Austin, W. A., '66 Mich.
Ayer, A. D., '77 R. I.
Ayers, Ezra J., '71 Mich.
Ayre, J., '71 Pa.
Ayres, Daniel, '73 N. Y.
Babbit, W. J., '70 N. Y.
Babcock, John L., '69 ——
Babcroft, D. S., '67 Mass.
Back, A. L., '67 Pa.
Backus, B. P., '66 N. Y.
Bagley, H. A. C., '74 Ga.
Bagly, George A., '63 Vt.
Bably, G. K., '64 Vt.
Baker, Charles A., '65 Pa.
Baker, D. S., '78 N. Y.
Baker, J. L., '80 Pa.
Balcome, Edwin, '66 Mass.
Ballady, G. L., '76 ——
Balley, W. E., '79 Vt.
Balmacedo, Publo Martinez, '80 Cuba
Bannister, R., '70 Pa.
Banton, J. F., '77 N. Y.
Barber, H. A., '71 Ohio
Barden, W. W., '67 N. Y.
Barnes, Enos, '71 Ohio
Barnes, G. B., '72 ——
Barnes, George, '74 N. Y.
Barnes, T. L., '80 Pa.
Barnes, William, '68 Pa.
Barnum, George, '65 N. Y.
Barr, B. H., '76 Ohio
Barret, A. G., '65 Pa.
Barret, M. E., '75 Pa.
Barret, W. E. M., '73 Mass.
Barrows, H. G., '67 Mass.
Barrows, S., '66 Mich.
Barstow, G. A., '79 N. Y.
Batchelor, W. J., '71 Mo.
Bates, C. S., '72 Pa.
Bates, H. O., '69
Bayard, J., '74 Del.
Bayne, W. F., '70 Ill.
Baynes, J. M., '65 Pa.
Beale, Edmond, '69 ——
Bean, E. D., '73 Ohio
Bean, James M., '69 ——
Bean, S., '64 Canada
Beasly, John Q., '79 Pa.
Bechtal, David, '73 Pa.
Bechtel, J. H., '65 Pa.
Bedortha, B. N., — N. Y.
Bell, D. D., '73 Pa.
Bell, S. R., '69 ——
Bell, William, '67 N. Y.
Bennet, A. G., '74 Ohio
Bennet, G. A., '77 Ga.
Benton, George S., '71 Can.
Bering, C. C., '65 Mass.
Berkett, C. H., '80 Ohio
Berry, H. J., '79 N. H.
Beshoar, M., '73 Colo.
Birch, A. W., '70 Ohio
Bishoff, C. W., '72 Pa.
Bishop, J. H., '77 Pa.
Blackwood, James C., '72 Mo.
Blake, W. H., '70 Pa.
Blanchard, H. H., '73, N. Y.
Bland, T. T., '72 Pa.
Blann, S. W., '78 N. Y.
Bledsoe, Henry, '72 Ga.
Bogue, Charles V., '79 Vt.
Bogue, Herbert E., '79 Vt.

Nothing else is specified in the docket. A Thomas B. Miller (again not specified as a doctor) was indicted on the charge of forgery in October of 1880."—(Reply, dated September 12, 1963, from the office of the Archival Examiner of the City of Philadelphia, in response to an inquiry of earlier date.)

Bohannon, John G., '58 Va.
Bonar, Benedict, '66 Vt.
Bond, B. F., '76 Ohio
Bond, H. T., '74 Pa.
Bostwick, C., '71 Pa.
Boulster, Edwin, '75 R. I.
Bowen, Albert H., '68 ——
Bowen, J. H., '78 N. Y.
Bowerman, S. B., '66 Pa.
Bowers, A. H., '78 Pa.
Bowers, J. K., '74 Va.
Bowie, John, '70 ——
Bowles, J., '59 Mich.
Bowlsby, H. H., '68 ——
Bowlsby, W. H., '70 ——
Boyle, A., '80 Va.
Boyle, P. T., '76 Ind.
Boynton, C. S., '68 ——
Bradway, J. H., '70 Pa.
Bradworth, J. H., '75 England
Brady, Johnstone, '70 Canada
Branstrup, W. T., '64 Ohio
Brantley, C., '66 N. Y.
Brawn, W. H., '69 ——
Bremen, M. P., '65 Conn.
Brickner, M. F., Jr., '79 Conn.
Briggs, T., '75 N. H.
Bringhurst, Isaiah '70 Pa.
Broadwell, A. J., '69 ——
Brook, Furman C., '66 Pa.
Brooke, Charles, '66 N. H.
Brooks, James B., '79 Pa.
Brooks, S. A., '79 N. Y.
Brosius, W. L., '80 Mo.
Brothers, C. E., '74 Ohio
Broughton, L. D., —— N. Y.
Brown, D. M., '70 Kans.
Brown, F. C., '73 N. Y.
Brown, G. W., '68 Pa.
Brown, J., '69 Canada
Brown, John H., '69 ——
Brown, W. E., '80 Mass.
Brownson, M. S., '70 N. Y.
Brownson, S. S., '71 Mich.
Bruce, John M., '71 Pa.
Brunswick, George, '74 England
Bryan, Abram, '69 ——
Bryan, James, '74 N. Y.
Bryant, J. R., '78 N. Y.
Buchanan, John, '58 Pa.
Buchanan, Joseph, '74 Texas
Bulick, T. M., '72 Pa.
Bulkley, R. C., '72 N. Y.
Bulmir, Thomas H., '68 ——
Burchell, John T., '73 Pa.
Burdick, J. T., '64 N. Y.
Burl, J., '65 ——
Burlton, H. B. H., '69 ——
Burner, H. R., '78 Ohio
Burns, C., '80 Pa.
Burns, Mrs. Julia A., '78 Ohio
Burns, Robert, '65 Canada
Burr, Frank S., '71 Conn.
Burrows, P. F., '76 La.
Burt, Andrew, '74 Pa.
Burt, Charles A., '78 N. Y.
Burt, J. A., '65 N. Y.
Burt, W. C., '78 N. Y.
Bush, John L., '75 Pa.
Bushnell, George W., '58 Ohio
Butler, Lafayette, '69 ——
Butler, Richard C., '67 Canada
Butnam, George F., '79 R. I.
Butterfield, Thomas, '71 England
Buzzell, R. D., '74 Me.
Calder, George, '70 Canada
Calkins, F. W., '58 Mass.
Cambell, R. M., '74 Pa.
Cameron, D., '74 Del.
Camp, E. E., '78 Ga.
Camp, J., '74 Pa.
Campbell, James B., '68 ——
Campbell, James, '69 ——
Campbell, James, '77 Pa.
Campbell, P. A., '76 Canada
Campbell, T., '74 N. J.
Campbell, Walter, '80 Pa.
Cannon, James, '68 ——
Cannon, William, '75 Canada
Cardon, A. S., '76 Mich.
Carman, George P., '75 Ill.
Carpenter, C., '79 Mass.
Carpenter, Hosea, '70 Pa.
Carpenter, J. H., '76 Canada
Carroll, Albert, '65 Mass.
Carsons, —— '64
Carter, J. H., '75 Ind.
Castellana, P. C. Y., '74 Cuba
Chamberlain, George, '68 ——
Chamberlain, M. S., '80 Mich.
Chamberlain, W., '67 Conn.
Chapman, A. V., '71 Pa.
Chapman, M. V., '72 Pa.
Charles, Henry, '66 Pa.
Chase, J. L., '80 N. Y.
Chellis, Edwin R., '69 ——
Cheney, John N., '67 Ga.
Cheney, W. S., '70 Vt.
Chiles, Edward, '74 Pa.
Chipman, S., '80 Pa.
Chippinger, H. G., '72 Pa.
Chisholm, J. W., '80 N. Y.
Christ, W. F., '74 Pa.
Christopher, C. C., '74 Vt.

Church, E. L., '80 N. Y.
Clapp, S. W., '61 Wisc.
Clark, —— '63 Canada
Clark, C. H., '69 ——
Clark, George, '77 Canada
Clark, George B., '79 Mass.
Clark, H. F., '71 Mass.
Clark, John, '66 ——
Clark, J. G., '75 Ind.
Clark, James N., '69 ——
Clark, M. T., '68 ——
Clark, R. H., '64 ——
Clark, Stanley G., '66 Can.
Clark, Stephen, '66 Vt.
Clark, W., '64 Pa.
Clegg, James, '73 Ohio
Clouse, Thomas J., '69 ——
Cloyne, M. W., —— Ohio
Clum, F. D., '73 N. Y.
Coba, J. Sanchezy, '74 Cuba
Cobb, Charles H., '4 Mass.
Cochran, L. R., '71 N. Y.
Coker, P. H., '74 Pa.
Cole, Edgar, '73 Pa.
Cole, William E., '69 ——
Colerick, A. E., '65 N.Y.
Colis, F. H., '71 N. J.
Collins, Charles, '75 N. Y.
Collins, L. C., '70 Pa.
Colton, J. W., '73 N. J.
Comfort, R. P., '79 Ohio
Con, Max, '79 Germany
Conant, Issiah, '65 Mass.
Conkling, J. B., '80 N. Y.
Conygoes, I., '76 Ind.
Cook, C. B., '78 Conn.
Cook, E. H., '77 N. Y.
Cook, Elias N., '79 Texas
Cook, Paul, '76 N. Y.
Coon, D., '65 ——
Coon, D. R., '65 Canada
Cope, David, '73 Mo.
Corel, A. W., '78 N. Y.
Coriel, A. '76 Ind.
Cornish, H. D., '70 N. Y.
Cory, Henry, '79 N. Y.
Coryell, S. D., '69 ——
Coursier, J. F., '70 Ky.
Covert, D. A., —— Ohio
Cowan, Young, '64 Canada
Cowden, J. W., '80 Ohio
Cowles, J. P., '58 N. Y.
Cox, H., '80 Canada
Craig, E. S., '80 Pa.
Crane, James B., '70 Pa.
Cranfield, T. E., '76 Texas
Crissman, Henry, '68 ——
Crombie, James, '74 Canada
Cronin, F. M., '75 Texas
Crowther, G. H., '74 England
Crumford, James, '64 Cal.
Crumrine, B. F., '60 ——
Cunningham, S., '80 Iowa
Cunningham, W. A., '76 Mass.
Cuterson, William C., '71 Pa.
Dake, D. S., '78 N. Y.
Dalzell, Given, '78 Scotland
Danforth, M. W., '69 ——
Danter, James F., '65 Canada
Darling, H. M., '80 ——
Darrin, V., '78 N. Y.
Davies, David, '70 Pa.
Davies, G. H., '79 Mass.
Davies, Rev. James, '77 Me.
Davis, David, '70 ——
Davis, E. M., '79 Pa.
Davis, E. S., '72 Mich.
Davis, F. M., '69 ——
Davis, H. S., '68 ——
Davis, Isaac, '71 N. Y.
Davis, J., '69 Pa.
Day, G. H., '66 Me.
Day, James, '70 ——
Day, James, '70 N. Y.
Dearborn, N. S., '76 N. H.
DeArrasbia, Adolph E., '78 Cuba
DeBeque, W. A., '72 Conn.
DeBurkarte, J., '70 Pa.
Dehln, William A., '73 Canada
Dehn, C. W., '72 Pa.
Dehn, W. H., '74 Vt.
DeHoff, E. S., '78 Ky.
Demme, Pierre, '64 Canada
Dennison, G. G., '80 Ind.
Dependorf, J. J., '72 N. Y.
Detinan, F. F., '77 R. I.
Dewey, S. T., '77 R. I.
Dickel, John G., '70 Pa.
Dickens, Robley, '69 ——
Dickerman, D. S., '71 Mass.
Dimmick, H. J., '65 N. Y.
Dimock, H. S., '67 ——
Dingman, James, '71 Canada
Doan, E. H., '72 Pa.
Docks, G. S., '80 N. Y.
Dodge, Mrs. E. G., '78 N. Y.
Dodge, R., '75 Vt.
Dolphin, T. J., '70 Pa.
Donahue, P., '74 Del.
Donaldson, E. P., '79 Mich.
Donaldson, G. W., '79 Mich.
Donaldson, Miles J., '67 Mass.
Donaldson, W. J., '68 ——
Dorner, Z. T., '74 Pa.

Doud, F. W., '79 Ohio
Dougherty, H. D., '77 Pa.
Douglass, J. N., '70 Pa.
Downing, Edw., '65 Canada
Drake, Mrs. A. B., '77 Mass.
Draw, Sebastian, '65 Cuba
Dudley, A. G., '76 Ohio
Dudley, H. A., '76 England
Duff, G. F., '67 Ga.
Duff, G. M., '69 ——
Duff, R. W., '69 ——
Duff, William Q., '69 ——
Duffin, W. H., '75 Pa.
Dumas, C. F., '66 La.
Duncan, Alexander B., '68 ——
Dunnington, W. H., '61 Ky.
Durham, J. S., '75 Ga.
Durham, W. H., '68 ——
Durham, W. R., '68 ——
Dutton, G., '76 Mich.
Earle, J. N., '71 N. C.
Eastland, J. S., '70 Wisc.
Eastman, C. J., '77 N. Y.
Eastman, S. N., '69 ——
Eaton, E. R., '70 Mass.
Eddy, P. P., '80 R. I.
Edison, G. A., '80 N. Y.
Edmonds, William, '78 Fla.
Edson, J. C., '64 N. Y.
Egar, E. T., '69 ——
Eggert, George C., '65 Can.
Ehle, George E., '75 Mich.
Eley, A. W., '69 ——
Ellegias, C., '80 Turkey
Ellerson, Ozias, '71 N. J.
Ellingwood, L. N., '80 Me.
Ellsworth, F. R., '69 ——
Ellsworth, V. A., '69 ——
Emerson, C. W., '79 Mass.
Emerson, H. A., '79 Mass.
Emigh, C., '72 Pa.
Emmert, F. B., '79 Md.
Entriken, Joseph, '76 ——
Etten, S. V., '80 N. Y.
Evans, Barak, '79 R. I.
Evans, C. B., '69 ——
Evans, E., '75 N. Y.
Evans, J. T., '69 ——
Evans, John M., '72 Pa.
Evans, Thomas, '75 N. Y.
Everly, M. M., '73 Pa.
Everson, John C., '59 Pa.
Everts, ——, '63 N. Y.
Everts, George S., '65 N. Y.
Fairlamb, George W., '70 Pa.
Fambro, A. A., '77 Ga.
Farr, E. D., '58 N. H.
Farr, William H., '58 Md.
Faulkner, J. M., '73 Pa.
Fellows, A. R., '72 N. H.
Fenton, W., '68 ——
Ferrey, R. Eaton, '59 N. J.
Ferry, W. A., '80 Va.
Field, M. M., '64 Canada
Finletter, H. H., '77 Ga.
Firth, H. E., '66 ——
Fisher, Charles, '66 Conn.
Fisher, D. K., '75 Pa.
Fisher, Joseph, '65 Pa.
Fisher, William J., '79 Me.
Fiske, C. E., Jr., '66 Pa.
Flagg, Andrew, '69 ——
Flagg, W. A., '63 Ill.
Flanders, A. L., '79 N. H.
Flanigan, H. M., ' 75 N. J.
Fletcher, George M., '69——
Flood, W. R., '76 Ga.
Floren, C. W., '68 ——
Folz, J. F., '77 Pa.
Forbes, E. E. L., '74 Del.
Ford, Augustus, '73 N. Y.
Ford, Rufus, '64 Colo.
Force, Levi, '67 N. Y.
Foster, W. H., '70 Me.
Foulds, Samuel, '78 England
Fowler, John M., '68 ——
Frailigh, W. S., '75 Canada
Frank, George, '70 Va.
Frank, L., '75 Pa.
Frank, L. C., '67 Mass.
Franks, Barron, '69 ——
Frantz, H., '76 R. I.
French, Charles, '67 Ga.
French, J. J., '80 Mich.
French, T. S., '67 Ga.
French, William, '77 Mich.
Frost, H. M., '67 Pa.
Frost, James, '73 Mass.
Fry, Daniel C., '71 Canada
Fuchs, F. L., '79 N. Y.
Fuller, L. D., '67 Conn.
Fullmer, John J., '58 Pa.
Furth, E., '80 Pa.
Fyfe, J. M., '78 Conn.
Gahegan, John, '73 Ohio
Gale, H. T., '75 N. Y.
Gallup, A. F., '73 Conn.
Gallup, Charles N., '74 Conn.
Gallup, J. B., '71 Conn.
Gamble, J. A., '74 Pa.
Gander, Benjamin, '78 Pa.
Gardner, W. S., '72 N. J.
Garland, George, '71 N. Y.
Garland, Guy W., '67 Mass.

Gay, Catherine C., '78 N. Y.
Gay, J. W., '70 N. Y.
Gehrett, B. F., '72 Pa.
Gerald, F. L., '69 ——
Gerald, M. W., '72 Mass.
Gibbons, J., '80 Pa.
Gibson, F., '76 W. Va.
Gibson, F., '78 W. Va.
Gilbert, D., '66 Pa.
Gilbert, F. B., '73 Pa.
Gildwir, David, '71 Canada
Giles, C. R., '74 Ga.
Gillespie, D. M., '68 ——
Gillingham, A., '80 S. C.
Gilpin, G. E., '71 Md.
Gisea, Fred A., '69 ——
Gish, A. S., '73 Pa.
Glass, James, '70 Pa.
Glenn, Thomas, '69 ——
Godon, Joseph A., '79 Md.
Goeriz, G. A., '72 Ind.
Gomez, Antonia M., '75 Cuba
Gonzalez, J. N., '77 Cuba
Goodman, G., '77 Canada
Goodrich, —— '73 Vt.
Goodrich, E. E., '64 Pa.
Goodrich, V. C., '69 ——
Goodrich, V. C., '70 Vt.
Goodsell, George A., '79 Mich.
Goodwin, Martin, '68 ——
Goodyear, Ephraim, '65 Mass.
Gordon, L. S., '75 N. Y.
Gore, Susan C., '72 Va.
Gorgas, ——, before '58, Pa.
Gorham, F., '80 Iowa
Gortchins, Lewis O., '78 N. Y.
Goss, L. J. M., '58 Ga.
Gould, Henry, '70 N. Y.
Graham, W. D., '69 ——
Granger, Norman, '78 Pa.
Granger, William, '58 N. Y.
Grant, Sidney D., '58 Conn.
Gray, Thomas, '67 Pa.
Green, G. W., '70 Pa.
Green, Reuben, '65 Mass.
Green, Thomas H., '69 ——
Greenenwald, J. H., '72 Pa.
Gregon, Thomas W., '77 Can.
Gregory, Edward James, '79 Eng.
Groth, H. H., '75 Texas
Grover, Lewis P., '69 ——
Gruelin, C. H., '75 Pa.
Guest, A. H., '75 England
Gustin, L. W., '76 Ohio
Haile, A. J., '70 Ga.
Haile, T. J., '70 Ga.
Haines, C. B., '64 Conn.
Hakes, John D., '67 Pa.
Hall, A. M., '75 Mass.
Hall, J. J., '64 ——
Haller, J. A., '73 Pa.
Halsted, J. G., '67 Canada
Hamaker, D. S., '66 Pa.
Hamelton, M. F., '76 Me.
Hamilton, R. H., '68 ——
Hamilton, R. P., '58 N. Y.
Hamilton, W. W., '80 Mo.
Hampton, H. J., '78 Ga.
Harbin, S. N., '78 Ind.
Harbison, William, '66 Pa.
Harle, S. E. W., '80 S. C.
Harper, Thomas, J., '69 ——
Harpur, William, '73 Tenn.
Harrell, James C., '70 Ky.
Harriman, G. R., '71 Mass.
Harriman, S. K., '71 Me.
Harris, Charles, '67 Me.
Harris, George A., '73 N. J.
Harrison, J. B., '70 Tenn.
Harshburger, D. W., '70 Pa.
Harthan, A., '75 N. Y.
Harthorne, H., '65 Pa.
Hassock, Thomas, '66 Canada
Hauptle, B. G., '80 Pa.
Haviland, N. H., '72 ——
Hawke, J. H., '67 Canada
Hawkins, R. H., —— Ill.
Hawkins, T. W., '68 ——
Hawley, C. M., '71 Ohio
Hawley, F. C., '68 ——
Hawley, Ira F., '78 N. Y.
Haya, Gabriel, '75 Cuba
Hayden, E. R., '80 Pa.
Hayes, Alb. H., '76 Mass.
Haymond, C. D., '75 N. Y.
Haymond, C. D., '76 ——
Haymond, C. L., '79 Me.
Hays, Walter, '72 N. Y.
Hazard, F. T., '73 Va.
Hazen, C. E., '80 Vt.
Hazen, D. L., '66 Mass.
Hazen, D. S., '66 Vt.
Hazzard, John, '66 Vt.
Heath, L. B., '77 Conn.
Heisley, C. W., '69 ——
Henderson, A., '74 Mass.
Henderson, F. F., '76 Ill.
Henderson, F. P., '67 Me.
Henderson, G. S., '67 Me.
Henderson, J., '74 N. Y.
Henderson, T., 80 Iowa
Henderson, T., '66 N. H.
Henderson, W., '69 ——
Henderson, W. H., '80 Cal.

Henderson, William, '67 Ga.
Hendricks, A. W., '71 Pa.
Hendricks, J. A., '80 Pa.
Hendricks, S. L., '70 N. Y.
Hendrickson, C. D., '68 ——
Henry, Joseph, '68 ——
Henry, Samuel, '68 ——
Henwood, Hugh, '68 ——
Herron, P. H., '66 Canada
Hibbert, Joseph, '76 ——
Higgins, C. P., '69 ——
High, John K., '66 Canada
Hilfrich, Joshua, '65 Canada
Hill, Cyrus, '79 Pa.
Hill, E. J., '80 N. Y.
Hill, George, E., '79 N. Y.
Hill, J. R., '65 N. H.
Hill, Joseph B., '72 Canada
Hillier, Fred, '66 N. Y.
Hillyard, M. H., '79 Mich.
Hinkle, W. T., '73 Pa.
Hirst, F. J., '73 N. J.
Hirst, F. R., '75 Iowa
Hobbs, H. C., '79 Ind.
Hobensack, J. B., '74 Pa.
Hobruin, T. H., '77 Honolulu
Hoff, J. S. M., '80 Canada
Hoffman, D. S., '73 Pa.
Hohnes, Mar. H., '66 Me.
Hoirt, E. G., '79 N. Y.
Hole, James M., '58 Ohio
Holland, W. H., '69 ——
Hollemback, J. N., '77 La.
Holmes, W., '76 England
Holton, John, '72, N. J.
Hong, S. B., '68 ——
Hooper, H. C., '67 Conn.
Hoorickson, J., '75 N. Y.
Hopkins, N., '64 Canada
Horton, A. G., '76 Mass.
Hotchkiss, M. S., '78 N. Y.
Howard, E. L., '69 ——
Howard, J. D., '70 Pa.
Howell, G., '64 Pa.
Hubbell, A.A ., '69 ——
Huchkins, Enos, '76 N. H.
Hudson, Edw., '70 Mich.
Hughes, I. B., '72 Pa.
Hume, S. T., '74 Me.
Hunt, William, '69 ——
Hunter, Abram, '69 ——
Hunter, David J., '69 ——
Huntingdon, C. S., '72 ——
Huntingdon, R. C., '71 Ohio
Hurd, W. H., '64 ——
Hurtham, Amanda, '78 N. Y.
Hustler, N., '75 England
Hutchings, George H., '68 ——
Hutchins, A. W., '72 Canada
Hutchins, H. T. G., '67 Pa.
Hutchinson, James, '74 Canada
Hyde, V. D., '71 Ohio
Hylton, Thomas, '77 Mass.
Infante, Henricus Canals, '73 Cuba
Ingham, H., '76 Mass.
Ingliss, George, '70 Canada
Ingram, George A., '72 Pa.
Irwine, Thomas, '69 ——
Isaacs, Judah, '63 Pa.
Ives, Robert, '73 N. J.
Jackson, M. J., '80 N. Y.
Jackson, W., '71 Ind.
Jacobs, J. B., '76 Me.
Jacobs, M. M., '76 Me.
Jacobus, Peter N., '58 N. J.
Jacques, A. J., '72 Conn.
James, D. P., '69 ——
James, Henry, '66 Canada
James, John, '70 Mass.
James, Moses S., '65 Ga.
James, T. T., '74 N. Y.
Janes, Charles A., '74 Mass.
Janey, Joshua D., '71 N. J.
Janiehl, Joseph, '80 Poland
Jardine, A., '64 Conn.
Jaynes, A. W., '71 N. Y.
Jeffries, Howard, '69 ——
Jenner, Peter, '68 ——
Jennings, E. L., '71 Mo.
Jennings, J. B., '74 Va.
Jennings, R. T., '73 Ga.
Jennings, W. H., '74 N. Y.
Jerves, A. A., '77 England
Joanson, Henry B., '79 Vt.
Johnson, E. D., '58 Conn.
Johnson, Joseph W., '80 Ga.
Johnson, R., '75 N. Y.
Johnson, W. R., '76 Mass.
Johnstone, J. K., '71 Canada
Johnstone, J. R., '71 Canada
Johnstone, William, '74 Canada
Jolly, W. F., '69 ——
Jones, Asa, '65 Pa.
Jones, B. C., '69 ——
Jones, Charles B., '68 ——
Jones, D. W., '73 Va.
Jones, E. G., '70 Me.
Jones, George S., '72 Pa.
Jones, Henry, '66 Va.
Jones, Henry, '77 Md.
Jones, James, '67 Pa.
Jones, John J., '71 N. Y.
Jones, L. S., '79 Md.
Jones, P. Clayton, '73 Conn.

Jones, Richard, '65 Pa.
Jordan, Emma S., '80 Pa.
Jordan, Robert J., '73 England
Josselyn, M. E., '79 Mass.
Jullaird, Peter, '80 Ohio
Kay, J. H., '74 England
Kay, John P., '65 Canada
Kay, Joshua R., '79 Mich.
Keck, C., '76 ——
Keck, C. E., '76 Germany
Keck, Charles, '77 Germany
Keck, George, '76 ——
Keith, B., '64 N. Y.
Keith, G. W., '69 ——
Keller, F. G., '75 Ohio
Kelly, H., '67 Mo.
Kelly, P. M., '69 ——
Kempton, W. C., '72 ——
Kempton, W. C., '72 Kans.
Kennedy, C. C., '80 Mich.
Kenney, M. B., '70 Mass.
Kenney, Robert, '67 Canada
Kent, Rufus, '66 Vt.
Kilborn, Henry F., '69 ——
Kilburn, A. L., '79 Vt.
Kilburn, Henry W., '69 ——
Killburn, H., '74 Pa.
Killburn, H. B., '77 Pa.
Killey, David, '68 ——
Kimberly, J. F., '76 Pa.
King, Alexander, '67 Pa.
King, Charles, '64 Canada
King, J. L., '76 N. Y.
King, J. Wat., '65 Conn.
King, O. A., '65 Mass.
King, Octavius, '65 ——
King, W. H., '58 Canada
Kingsford, William, '79 Mass.
Kinne, E. W., '80 N. Y.
Kirkbride, J. J., '75 Miss.
Kirkman, E., '74 N. J.
Kirkman, Edward, '78 N. J.
Kitchen, George H., '76 ——
Kitchen, George H., '70 Pa.
Kline, D. D., '65 Pa.
Kline, J. H., '67 Pa.
Kline, R. H., '59 Md.
Kluce, T. H., '79 Mich.
Knight, C. B., '70 N. Y.
Knight, Daniel, '79 R. I.
Knight, J., '67 N. Y.
Knight, Over. C., '65 Canada
Knowles, ——, '63 Del.
Knowles, J. T. F., '80 Del.
Knowls, Edward, H., '79 Conn.
Konwendeshon, —— '78 Canada
Kordenat, Fred W., '78 Pa.
Krauss, L. S., '80 Md.
Kreutsburg, Charles, '76 Ger.
Kumey, B. F., '76 Ohio
LaBella, Martin J., '79 Vt.
Lake, D., '71 Canada
Lake, M. R., '76 Iowa
Lake, Samuel K., '67 Pa.
Lamereux, John, '76 Mich.
Lamoreaux, Charles H., '75 Mich.
Lane, William A., '73 Pa.
LaRoche, Pierre, '80 Pa.
Laughlin, J. W., '71 N. J.
Lautz, L. R., '80 Pa.
Leahey, M. M., '77 Mass.
Leahy, D. J., '80 Mass.
Leaver, George, '75 England
Lees, H. W., '70 Pa.
Leonard, Volney, '79 Pa.
Lester, D., '78 N. Y.
Lewis, George, '63 Me.
Lewis, Reading, '72 Pa.
Lewis, Sans, '69 ——
Ligon, W. D., '74 Texas
Linderman, F. L., '64 Ohio
Lindhurst, William, '79 Pa.
Little, Oscar O., '71 Va.
Livingston, C. C., '79 Ohio
Livingston, J. K., '75 Pa.
Locke, L. E., '59 Ala.
Longacre, J. L., '79 N. J.
Longest, C. A., '76 England
Looney, J. J., ——
Love, H. W., '80 Pa.
Lovejoy, J. W., '67 N. Y.
Lovejoy, S. T., '67 Mass.
Low, Phoebe, '72 N. Y.
Lowery, J. '75 Texas
Lucas, J. B., '80 Ohio
Ludlam, J., '74 N. J.
Lynch, N. R., '59 Del.
MacDonnel, D., '69 ——
Mackey, Thomas J., '78 England
Maddock, A. H., '76 England
Magee, W. T., '69 ——
Magee, Rev. W. T., '63 ——
Maisatan, F., '79 Va.
Manger, James S., '68 ——
Mann, T. M., '64 N. Y.
Manning, W., '74 Pa.
Manwarren, G., '80 N. Y.
Mark, Robert, '75 Canada
Marsh, M. H., '76 Mass.
Martin, W. H., '78 Ky.
Master, G. A., '74 Ohio
Mathews, J., '73 Ohio
Matlack, M. J., '75 Pa.
May, A. Smith, '80 Ohio

Mayer, Daniel, '64 W. Va.
McAleer, George, '69 ——
McCausland, W. J., '72 Pa.
McClure, Robert, '65 Pa.
McColl, Alexander, '72 Can.
McColl, Charles, '68 ——
McCollom, A., '75 N. Y.
McComas, James, '72 Mo.
McCoombir, W., '66 N. Y.
McCoy, E., '75 Pa.
McDaniel, W. S., '76 Ga.
McDonald, H., '76 Iowa
McDonald, James, '74 Cal.
McDonald, Robert, '68 ——
McDonald, S. P., '80 Canada
McDonnel, J. '66 Mass.
McDowell, H. C., '70 Ohio
McElroy, Thomas, '71 Pa.
McGhie, M. T., '69 ——
McGregor, Norman, '64 Canada
McGuire, J. A., '69 ——
McHenria, J., '67 Mo.
McIlween, J. B., '70 S. C.
McIntosh, F., '64 Canada
McIntosh, James H., '68 ——
McIntosh, John Wesley, '60 N. C.
McIntyre, L., '69 ——
McKendyl, C., '65 Pa.
McLaughlin, John, '80 Pa.
McLean, Duncan, '69 ——
McLein, George, '68 ——
McMichael, Abraham, '67 Can.
McMurray, James, '72 Pa.
McMyers, C., '80 Ind.
McQuillan, R., '74 Ohio
McSellan, Alexander '68 ——
Mease, J. M., '72 N. C.
Mellor, George, '70 Pa.
Merino, S., '64 Cuba
Merkle, Solomon B., '68 Pa.
Merrirean, G. B., '78 N. Y.
Meru, T. '66 Cuba
Meyers, Daniel E., '68 ——
Meyers, William, '73 Mo.
Miles, T. M., '70 Pa.
Milley, A. R., '77 W. Va.
Miller, D., '64 Pa.
Miller, E., '75 N. H.
Miller, I. A., '76 Cal.
Miller, John, '65 N. J.
Miller, John A., '63 ——
Miller, John A., '63 N. J.
Miller, M. H., '63 ——
Miller, R. D., '79 Mich.
Milliken, Roscoe G., '65 Me.
Mills, W. G., '74 Utah
Mixter, E. S., '74 Conn.
Moe, M. C., '69 ——
Moffatt, W. C., '78 Iowa
Monroe, W. C., '74 N. Y.
Montgomery, Joseph R., '79 Pa.
Moore, Alexander, '69 ——
Moore, D. R., '76 Canada
Moore, J. M., '78 N. Y.
Moore, R., '64 Kans.
Morden, S. A., '70 Ind.
Morehouse, J. C., '80 Can.
Morgan, K., '77 Mo.
Morrow, Samuel, '65 Conn.
Morse, F. A., '77 N. H.
Mort John C., '80 Pa.
Morton, Thomas, '64 Pa.
Mott, H. T., '67 N. C.
Moyer, F. J. '75 N. Y.
Muir, J., '68 ——
Mulligan, P. J., '58 N. C.
Mulloy, J. B., '80 Ohio
Mundy, H. L., '80 Pa.
Muriel, Ramon Ruiz y, '77 Cuba
Murray, Charles, '63 N. Y.
Murray, G. S., '80 N. Y.
Musas, George W., '69 ——
Musser, Peter C., '58 Va.
Musser, William, '75 Ill.
Myer, Charles F., '79 N. J.
Myers, Elias L., '71 Pa.
Myers, John H., '71 Pa.
Myers, William H., '71 Pa.
Nash, John, '68 ——
Neall, Charles H., '75 Pa.
Nebeker, A., '72 Pa.
Nelson, Harbey, '79 Ind.
Neuzuling, John, '80 Ga.
Nevling, T. S., '70 Pa.
Newburgh, William J., '69 ——
Newell, G., '73 N. Y.
Newfeld, F. S. ——
Newman, Edwin, '68 ——
Newman, G. B., '79 Mich.
Newman, W., '75 Ga.
Newton, Horatio G., '58 Me.
Newton, John L., '73 Canada
Newton, R. D., '75 Kans.
Nicholas, J. B., '72 Pa.
Nieberger, James A., '69 ——
Northup, Erle W., '75 Pa.
Norton, O. W., '67 Me.
Noxon, Allen, '68 ——
Nutting, W. W., '80 Iowa
Nuzerling, J., '80 Germany
Oakes, Ephraim, '73 Mass.
Oakes, Hobert, '75 Me.
O'Brien, P., '67 Fla.
O'Brien, Philip T., '72 Mass.

Odott, C. A. D., '77 Pa.
Offord, Joseph S., '78 England
O'Harra, Joseph, '65 Pa.
Olbe, George S., '58 ——
Olin, E., '80 N. Y.
Loiver, J. Hughes, '77 Pa.
Omillian, J. H., '69 ——
Orlinder, Daniel, '66 Mich.
Orr, David, '72 Mo.
Orr, David F., '72——
Orser, E. F., '80 Canada
Ortenald, J. F. E., '76 Pa.
Orton, D. T., '67 N. Y.
Osborn, D. O., '71 Ga.
Osborn, Francis, '73 Ohio
Osborn, M. C., '71 Ga.
Osborne, C. M., '76 Ga.
Owen, B. A., '74 Oregon
Pabst, G., '76 Pa.
Packard, James A., '70 Pa.
Paine, G. G., —— Scotland
Paine, Olliver Dwight, '69 Okla.
Palman, J. E., '77 England
Pape, Leopold, '71 Ohio
Park, Ira R., '70 Pa.
Parkinson, N. S., '68 ——
Parks, A. T., '74 Pa.
Parr, John, '79 Mich.
Parsons, John H., '71 N. Y.
Partrick, W. R., '75 Pa.
Patterson, W. K., '68 ——
Paul, David, '65 Pa.
Paul, J. Fletcher, '74 Mass.
Payne, C. E., '76 Mich.
Payne, Thomas, '69 ——
Peacock, —— '63 N. J.
Peacock, John, '64 Pa.
Pearson, Jones, '64 N. H.
Pechir, William H., '69 ——
Peck, M. G., '78 N. Y.
Pemoy, E., '66 N. Y.
Peraltay, F. G., '79 Cuba
Perkins, —— '61 Mass.
Perkins, Benjamin, '67 Mo.
Perkins, George T., '59 Mass.
Perkins, Joseph C., '79 N. H.
Perkins, T. T., '74 Me.
Perry, J. W., '67 Ga.
Peyton, L. D., '73 Ky.
Phelps, W. J. '72 Mo.
Phillips, Abel P., '67 Pa.
Phillips, B. B., '76——
Phillips, C. J., '70 Pa.
Phillips, O. T., '76 N. J.
Phillips, R. E., '72 N. Y.
Phinnell, John T., '69 ——
Pierce, Sidney W., '75 Me.
Pinard, V. H. A., '78 Conn.
Pinkerton, R. A., ——
Piper, A. T., '80 Mo.
Piper, Able, '64 N. H.
Piper, George T., '67 Pa.
Piper, Thomas, '69 ——
Pixley, E. S., '77 Mass.
Platt, James A., '71 Pa.
Porter, B. F., '78 S. C.
Porter, B. F., '80 S. C.
Posey, David, '59 Mo.
Post, D., '80 Fla.
Post, George H., '74 N. Y.
Post, James R., '71 Canada
Potts, John S., '73 Mo.
Preston, G. B., '76 Pa.
Priest, S. C., '69 ——
Pritchard, J. J., '74 Iowa
Proctor, Columbus J., '58 Pa.
Proper, James S., '71 Pa.
Putnam, W. F., '77 Me.
Pynchon, E., '72 N. Y.
Querner, Emil, '67 Pa.
Quertum, Edw., '65 Pa.
Quick, T. S., '73 N. Y.
Quinn, S. S., '69 ——
Quinn, Thomas, '67 Canada
Rae, Hugh V., '66 Canada
Rallston, Lewis, '77 Pa.
Ramsay, Robert, '68 ——
Randall, O. G., Jr., '79 Mass.
Randle, G. R., '71 N. Y.
Reich, B. F., '69 ——
Reich, George W., '71 Pa.
Reid, Henry W., '73 N. J.
Remak, K. L., '76 ——
Reuss, William, '75 Pa.
Reynolds, G. W., '80 Mass.
Rhoades, J. H., '70 Pa.
Rhodes, G. W., '73 Va.
Rich, John G., '58 Pa.
Richard, Adolph, '79 Costa Rica
Richards, Daniel, '65 N. Y.
Richardson, F. C., '69 ——
Richardson, G. G., '80 Me.
Richardson, Isaac K., '69 ——
Richardson, James, '71 England
Richardson, John, '64 Wisc.
Richardson, T., '65 ——
Richman, A. L., '80 N. Y.
Riffer, S., '79 W. Va.
Riffle, S., '76 W. Va.
Riggs, A. M., '75 Mass.
Riley, C. W., '69 ——
Ripley, W. K., '70 N. H.
Rittenhouse, Alvah, '67 Pa.
Rittenhouse, Henry, '63 ——

Rizer, P. T., '75 Md.
Robbins, C. B., '64 Canada
Robbins, J. W., '73 N. J.
Robbins, Wesley, '80 Ohio
Roberts, L. P., '67 N. Y.
Robertson, Fred, '77 England
Robertson, George A., '64 N. J.
Robertson, Henry, '68 ——
Robertson, J. O., '67 Conn.
Robertson, R. R., '76 Ga.
Robertson, T. S., '68 ——
Robinson, C. M., '72 Mo.
Robinson, Fernando S., '69 ——
Robinson, G. F., '73 Va.
Robinson, R. J., '73 Ohio
Robinson, Thomas, '74 Canada
Robinson, William F., '79 Texas
Robinson, William O'Dell, '67 Can.
Rogers, Levi, '66 Pa.
Rogers, Robert, '66 N. H.
Rogers, Thomas A., '67 N. Y.
Rohback, A. G., '68 ——
Rose, E. A. B., '72 Canada
Rose, Francis, '69 ——
Rose, H., '69 ——
Ross, John, '69 ——
Rowden, Philip, '70 Ind.
Rowe, C. P., '76 Me.
Rowland, Ed. E., '79 Eng.
Rowth, S. S., '75 N. J.
Ruffell, George T., '75 Pa.
Rush, Charles S., '70 N. H.
Russ, O. G., '80 Ohio
Russell, F. H., '76 Mass.
Russell, Richard, '73 Mass.
Rutherford, C., '64 Canada
Saint Maria, Eliz., '78 Can.
Salisbury, C., '75 Ohio
Salter, M. P., '80 Ga.
Sanborn, R. H., '70 Mich.
Sands, A. E., '78 N. Y.
Sansom, S., '80 England
Sansom, Samuel, '79 Eng.
Santee, Thomas, '72 Pa.
Sargeant, J. A., '78 Pa.
Sargeant, O. S., '76 Mass.
Satterlee, D. S., '70 ——
Satton, W., '70 ——
Sawyer, William, '77 Mass.
Scherff, A., '74 Pa.
Schofield, Thomas, '73 Eng.
Schroeck, W., '80 Germany
Schultz, Peter H., '79 Pa.
Scott, Stanley, '68 ——
Scudder, J. W., '80 Vt.
Seher, H. L., '75, Pa.
Seip, C. L., '76 Pa.
Selick, Eph., '73 Ohio
Selover, Charles B., '74 N. Y.
Shank, William, '69 ——
Shattuck, A. L., '69 ——
Shaw, G. J., '66 Me.
Sherbenford, W. R., '65 Can.
Shermer, D. A., '71 Md.
Shiffler, William, '65 Pa.
Shim, T. C., '77 N. Y.
Shirrey, Peter F., '70 Pa.
Shoemaker, John, '72 Pa.
Shoemaker, L., '66 N. Y.
Sibol, F., '77 N. Y.
Sidney, E. W., '64 Mass.
Sievestra, Donald, '64 Cuba
Siggins, John J., '70 Pa.
Sigismund, J. M., '72 Ger.
Sigismund, S. B., '72 Ger.
Silva, Damian, '79 Cuba
Silvernail, W. M., '71 N. Y.
Simmons, F., '70 N. Y.
Simmons, J. R., '74 Ga.
Simmons, J. T., '67 Ga.
Simmons, Thomas, '70 N. Y.
Simpson, R. A., '65 Pa.
Simpson, Samuel, '72 Mo.
Sinclair, John M., '67 Can.
Singleton, Thomas A., '73 Ga.
Skagg, A. E., '80 Del.
Skein, Fred, '64 Mich.
Slack, Watson, '75 Mo.
Slater, J. J., '75 England
Slee, A., '75 Ohio
Sleeper, Joseph J., '75 Pa.
Sleeper, T. D., '70 N. J.
Smith, ——, '66 N. Y.
Smith, A. B., '58 Md.
Smith, A. J., '72 ——
Smith, A. L., '69 ——
Smith, C. B., '79 N. Y.
Smith, Cady, '80 Pa.
Smith, E. B., '80 Pa.
Smith, E. C., '70 N. N.
Smith, Ezra A., '73 Vt.
Smith, G. W., '69 Ind.
Smith, H. D., '69 ——
Smith, J. K., '73 Pa.
Smith, J. M., '73 Ky.
Smith, John, '71 N. Y.
Smith, John, '79 Pa.
Smith, M. D., '73, Vt.
Smith, M. H., '70 ——
Smith, Marion R., '80 N. Y.
Smith, Robert, '66 N. Y.
Smith, S., '78 N. Y.
Smith, Mrs. S. S., '76 Eng.
Smith, Simon, '78 N. Y.

Smith, W. O., '77 Pa.
Soules, S. George, '79 Vt.
Southard, Benj. H., '71 Can.
Spencer, Henry, '73 Mass.
Sprague, O. C., '78 N. Y.
Squire, T. O. ——
Squire, W., '66 Tenn.
Stafford, C. J., '74 Mich.
Stark, Alex., '73 Can.
Starr, John P., '72 Ga.
Stauffer, A. W., '80 Pa.
Stearns, Levi, '71 Mich.
Stebbins, James, '74 Pa.
Steel, Daniel L., '71 Can.
Steel, John, '74 Can.
Steen, J. H., '69 ——
Stevens, A. B., '79 Pa.
Stevens, J. R., '74 N. H.
Stevens, John, '72 Me.
Stevenson, John M., '79 N. J.
Stevenson, M., '70 Pa.
Steward, T., '66 Pa.
Stewart, Benj., '79 N. J.
Stewart, James, '71 Pa.
Stewart, R., '68 ——
Stillman, A. G., '63 Vt.
Stockton, E. C., '64 Pa.
Stoddard, C. B., '75 N. Y.
Stokes, R. S., '64 Conn.
Stone, H., '64 Can.
Stout, O. C., '78 N. Y.
Stout, W. C., '71 Md.
Stowell, T., '68 ——
Stratford, George, '76 ——
Strawn, H., '74 Mass.
Streeter, C. A., '70 Mass.
Streeter, H., '76 N. Y.
Stryker, W. H., '76 Mass.
Sutherland, J. H., '67 Can.
Sutherland, Lachlin, '66 Can.
Swain, R., '71 Pa.
Sweeney, Albert, '69 ——
Sweet, H. A., '65 ——
Swigart, Joshua, '70 Md.
Taft, Louis W., '68 ——
Talbot, E. S., '75 Pa.
Tarch, Samuel, '77 Ky.
Taylor, Amos, '80 Pa.
Taylor, David, '74 Cal.
Taylor, Edw. W., '79 R. I.
Taylor, J. S., '68 ——
Taylor, W. A., '79 Pa.
Taylor, Zane B., '79 Pa.
Teeple, Hiram, '68 ——
Templeton, S., '75 Vt.
Tempstiten, Elijah, '77 Vt.
Tensbad, C. P., '76 Pa.
Terens, Felipe C., '76 Cuba
Terryberry, J. G., '68 ——
Thackera, J. C., '69 ——
Theel, F. G., '79 Germany
Thomas, Charles D., '73 N. Y.
Thomas, Enoch, '79 Ohio
Thomas, Josiah, '68 ——
Thomas, O. F., '66 N. Y.
Thomas, R., '66 ——
Thompson, B., '70 Iowa
Thompson, J., '65 Pa.
Thompson, J. A., '58 Pa.
Thompson, J. Y., '69 ——
Thompson, James, '63 Eng.
Thompson, Joseph, '73 Ga.
Thompson, W., '75 Mass.
Thormley, Joseph, '74 Eng.
Tiffany, George, '79 Conn.
Tilbebridge, I. T., '76 Ohio
Tilden, H. E., '78 N. Y.
Tinsley, William C., '67 Ga.
Titcomb, George P., '68 ——
Titus, William, '66 N. J.
Tobold, L. E. F., '79 Pa.
Todd, A., '80 Pa.
Todd, M. A., —— N. Y.
Tollerton, L. H., '78 N. Y.
Toque, I. S., '76 Canada
Trailkill, J. W., '63 Ill.
Trask, P. B., '76 Me.
Traver, A. J., '66 Pa.
Tribble, S., '76 Ill.
Trice, W. C., '78 Pa.
Trotter, Isaac, —— Conn.
Troyer, T. S., '74 Ill.
Trudgion, William, '79 Wisc.
True, C. C., '77 Vt.
True, Alfred, M., '71 Mass.
Truman, A. M., '80 Mo.
Truman, A. W., '70 N. Y.
Trumbower, John, '72 Pa.
Tucker, J. A., '80 N. H.
Tucker, J. H., '70 Ga.
Tuma, J. C., '78 Ecuador
Turner, James T., '72 Pa.
Tyfe, J. M., '78 Conn.
Tyson, Joseph, '66 N. Y.
Ullyot, Henry, '67 Can.
Ussher, B. B., '70 Ohio
Valmasedo, P., '80 Cuba
Vandermark, A., '80 N. Y.
Vanender, O. T., '80 Pa.
VanScoy, E., '72 N. Y.
Villarst, C. J., —— N. Y.
Vining, George, '67 Mass.
Vinning, David T., '58 Mass.
Virgil, W. A. M., '75 N. Y.

Voice, James, '79 N. Y.
Volland, P. C. E., '80 Ger.
Wade, A. P., '63 ——
Wagner, M., '71 Pa.
Walk, F., '71 Pa.
Walker, A. B., '72 Fla.
Walker, A. B., '73 Ohio
Walker, A. C., '80 Pa.
Walker, C. B., '77 Ill.
Walker, Charles E., '79 Ga.
Walker, James, '65 Pa.
Walker, R. J., '69 ——
Walker, W., '68 ——
Walkinson, S. S., '68 ——
Wallace, L., '72 N. J.
Wallace, Leml., '71 N. J.
Wallace, William H., '73 N. Y.
Walmsly, James A., '70 N. J.
Walson, George R., '73 N. J.
Walter, David G., '76 Pa.
Walters, William, '69 ——
Walworth, John C., '69 ——
Warburton, William, '66 Conn.
Ward, C. A., '79 N. J.
Ward, F. V., '69 ——
Wardell, Henry, '78 England
Wardwell, C. W., '77 N. Y.
Warner, J. C., '69 ——
Warner, Richard, '69 ——
Warren, Henry, '77 Mass.
Washburn, G. C., '67 Vt.
Washburn, S. F., '68 ——
Washington, Oct., '69 ——
Wassezzerry, R., '75 Pa.
Waters, B. F., '77 Pa.
Waters, F. C., '75 N. Y.
Waters, Henry, '72 Me.
Watkins, A. V., '71 N. Y.
Watson, E., '74 Ill.
Watson, George S., '71 Me.
Watson, John, '64 Pa.
Watson, Joseph, '65 Mass.
Watson, William W., '66 Me.
Watters, William, '70 Canada
Watts, C. F. E., '80 Ga.
Watts, George T., '70 Ga.
Waugh, T. R., '71 N. Y.
Weaver, H. K., '67 N. Y.
Webb, Edgar, '69 ——
Webster, C. S., '80 Mich.
Webster, D. P., '67 Vt.
Weigel, Michael, '70 N. Y.
Wells, F. G., '73 N. J.
Wengert, J. W., '70 ——
Wentworth, Q. F., '76 ——
Wenzell, John, '65 Pa.
Werdir, W. E., '78 Ohio
West, George M., '75 N. Y.
Westcott, J. H., '72 N. Y.
Weyburn, H. D., '80 N. Y.
Weyl, William F., '72 Pa.
Wheeler, J. D., '61 N. Y.
White, —— '66 Scotland
White, D. A., '80 N. Y.
White, David, '73 Ohio
White, J. H., '76 Mass.
White, James W., '77 Tenn.
White, M. D., '79 N. J.
White, N., '79 N. Y.
White, Thomas, '69 ——
Whitehead, E. N., '76 N. Y.
Whitehouse, T. G., '68 ——
Whitney, E. B., '73 Ga.
Whitney, I. J., '77 N. Y.
Whittier, F. T., '80 N. Y.
Whittkamp, J. V., '70 Pa.
Wiard, William, '67 Conn.
Wiggins, J. H., '69 ——
Wiggins, Thomas, '69 ——
Wilde, C., '74 Pa.
Wiley, J. W., '79 Mo.
Wilkie, L., '80 Can.
Wilkins, J. D., '76 N. Y.
Willey, Jon A., '63 ——
William, L. D., '70 Mich.
Williams, E. D., '80 Md.
Williams, E. I., '76 Pa.
Williamson, Matthew, '69 ——
Williamson, Peter, '68 ——
Wilson, H. H., '74 Mich.
Wilson, James, '71 New York
Wilson, Job, '67 Canada
Windsor, William, '74 Eng.
Wishart, L. Q. C., '63 ——
Wistar, Louis, '66 N. H.
Wittkamp, L. M., '69 ——
Woland, W. H. H., '72 Pa.
Wood, Horace D. G., '79 Ind.
Wood, John '68 ——
Wood, Thomas P., '78 Pa.
Woodworth, W. F., '75 Ill.
Woodyion, D. G., '58 N. Y.
Woolhiser, O. T., '69 ——
Wooster, T. F., '80 Pa.
Worrell, John P., '66 Pa.
Wright, Benj. '68 ——
Wright, J. H., '69 Ohio
Wright, Joseph W., '78 N. Y.
Young, H., '74 N. Y.
Young, J. E., '76 Ga.
Young, J. H., '76 ——
Young, W., '70 ——
Zeitz, Aug., '80 Poland

List of Paine's-Miller's Graduates

The lists for the years from 1873 to 1876, inclusive, have not been obtained. An asterisk before a name indicates that the diploma-holder graduated after 1872, and, according to the Attorney General, holds his diploma without legal authority. Not all of these persons were quacks, for some of them subsequently took the legally required training and made every effort to perfect their knowledge of medicine. The Philadelphia Record for July 17, 1880, estimates that "over six hundred alleged doctors were ground out of this patent doctor shop."

Abbey, E. C., N. Y.
Abney, E. S., S. C.
Aborn, E. S., Pa.
Adair, Charles H., Ind.
Adams, N. R., Ohio
Adams, S. P., Texas
Ader, Henry, Ind.
Albright, H. E., Mo.
*Alcott, William C., Pa.
Allen, Peter A., N. Y.
Alvord, Hiram, Ind.
Anders, W. K., N. C.
Anderson, Edw. C., Mich.
Andrews, J. B., Pa.
Andrews, R., Jr., N. Y.
Andrews, T. P., ——
*Appley, Harrison V., N. Y.
Armstrong, J., Pa.
Armstrong, William, Pa.
Arnold, Daniel, Ohio
Aswell, D. S., La.
Atkins, Lyman, Ind.
Atkinson, Charles P., N. J.
Auvache, Thomas E., Pa.
Babcock, Cyrus, N. Y.
*Bachman, Theo. S., Pa.
Bacon, A. E., Mich.
Bailey, Morris, Vt.
Baker, C. L., N. Y.
Baker, S. C., N. Y.
Balch, E. T., N. Y.
Bancroft, William M., Pa.
Barkey, Peter, Canada
Barnes, T. B., Pa.
Barnes, W. W., Maine
Barrett, W., Ohio
Bartlett, Bradey, I. I., Mo.
*Bartlett, Lucien, N. Y.
Bascom, J. K., N. H.
Bassett, Eugene A., Mass.
Bayard, H. M., Pa.
Beach, L. W., Pa.
Beam, L. T., Pa.
Beamer, John B., Ohio
Beck, S. T. E., N. Y.
Belknap, E. G., Pa.
Bell, S. A., N. C.
Belts, J. N., N. Y.
Beltz, D. E., D. C.
Bemis, N. M., Minn.
Bennett, A. A., N. Y.
Bennett, C. C., Mass.
*Berry, J. L., Calif.
Bichley, G. G., Pa.
Bigelow, James C., Pa.
Bigelow, James H., Pa.
Biggar, Ham. F., Ohio
Bittle, William, Pa..
Black, James T., Pa.
Blackestee, J. P., Ind.
Blake, D. A., Pa.
Blake, T. F., Md.
Blakeney, N. F., ——
*Bland, Mary C., N. Y.
Blough, H. R., Pa.
*Bolles, Chris, C. Pa.
Bolles, H. A., N. Y.
Bolles, H. O., Ill.
Bon, J. H. I. M., Germany
Borland, J. R., Pa.
Bosworth, H. F., Ohio
Bowen, A. F., Pa.
Bowie, Alonzo P., Pa.
Boyd, R. A., Pa.
Bradford, Charles S., Mass.
Bradford, L. I. Pa..
Brecht, S. S., Pa.
Breeze, S. C., Ind.
Brick, Francis, N. H.
Bridgland, S., Ohio
Brookbiss, A. B., Fla.
Brooks, J., Pa.
Brown, James E., Pa.
Brown, H. H., Maine
Brown, I. M. F., Miss.
*Brown, Thomas D., Pa.
Buckley, C. ——
Buell, James K., Ohio
Bullis, W. L., Canada
Bullock, A. Dexter, Mass.
Burns, G. W., Pa.
*Butterfield, A. J., N. Y.
Buzzard, Samuel, Iowa
Byrns, L. L., N. C.
Cabell, R. H., Mo.
Caldwell, W. M., Ohio

Callahan, P. J., Ohio
Calver, G. W. H., Pa.
Calver, William, Pa.
Card, James C., Pa.
Carden, D. D., Canada
Carpenter, W. H., Mass.
Carr, W. S., Arizona Ter.
Carson, J. C., N. C.
Carter, E., Mich.
Case, L. F., Minn.
Cheney, N., Canada
Clapp, S. Lewis, Wisc.
Closson, A. L., Pa.
Clover, William M., Pa.
Clowes, John Q. A., Pa.
*Coble, Addison B., Pa.
Coble, J. W., Pa.
Cobler, F. S., Pa.
Coburn, W. C., Pa.
*Coffin, George O., Pa.
Collier, L. D., Md.
Collins, J. W., Ohio
Compton, J. Lewis, Md.
Cook, Abiat L., Mich.
Coons, Rufus, N. Y.
*Cooper, N. Dixon, Pa.
Cope, A. L., Pa.
Cornell, C. M. B., Canada
Cornell, H. S., Mass.
Cornell, S. S., Canada
Cotnonville, R. de, Pa.
Cowling, James, N. Y.
Coyle, C. L., Ohio
Craig, William, Ireland
Crandall, R. P., N. Y.
Cress, James, Pa.
Crockett, Fred E., Me.
Culp, S. C., Mich.
Culver, Nathan S., Wisc.
Dalton, E. G., Pa.
Daniels, L. A., Ohio
*Darmon, Charles H., Pa.
*Darmon, Emma A., Pa.
Davidson, J., Ohio
*Davis, Fred A., N. J.
Davis, John, Pa.
Davis, Judson, Ohio
*Davis, Robert N., Pa.
Day, George N., Me.
Diaz, E. Rubio y, Pa.
Dickerson, I. H., Ill.
Dildine, Z., N. Y.
Donaldson, F., N. Y.
Dorand, W. A., ——
Doucett, N. J., Mass.
Douglass, I., Mich.
Downs, Isaac M., N. J.
Draper, C., Pa.
Dreber, J. C., Ohio
Drelbelbis, D. L., Pa.
Drew, A. Edgar, Canada
Driver, R. F., S. C.
Duclos, E. A., Canada
*Dudman, Thomas W., Pa.
Duff, W. L., Pa.
Dulap, R., Mich.
*Dunn, Elisha C., Ill.
Durden, W. W., Miss.
Durkin, Austin, Pa.
Eardensohn, G., N. Y.
Earl, J. W., N. C.
Emmons, J. H., Conn.
Enterline, Samuel, Md.
Entriken, F. W., Ohio
Epley, G. W., Pa.
Estabrook, C. A., Ohio
Evans, J. M., ——
Everson, J. C., Pa.
Ewell, J. E. T., Md.
Ewing, Cicero M., Pa.
Fagans, Julian, Pa.
Fahrney, P. D., Md.
Faloon, Matthew, Ill.
Feerisch, Jacob, N. Y.
Fields, A. P., Pa.
Fiester, J. N., Ohio
Finch, Phinney, N. Y.
Flemming, D. L., Pa.
Floor, Frank V., Pa.
Flower, P. D., Pa.
Flower, W. S., Pa.
Foley, M., ——
France, Cyrus, W., Pa.
*Frassoni, Manfred P., Pa.
*Freeman, Willard W., Mass.
Fry, J. M., Ohio
Fry, J. S., Pa.
*Fuller, William H., N. Y.
*Fullerton, M. A., Ohio
Furey, Enos F., Pa.
Gaarder, O. V., Wisc.
Galloway, M. J., Pa.
Garter, Ruben, D. C.
Garver, L., Pa.
Garvin, E. F., Pa.
Garretson, Eli, Ohio
Gate, G. L., N. Y.
Gazley, Henry C., N. Y.
Gendall, J., Pa.
George, H. S., Pa.
Gibbs, Aaron, L., N. J.
Gibson, M., Pa.
Gilbert, J. F., Neb.
Goehrig, W., Pa.

Goersen, G. F., N. Y.
*Golborne, John H., Pa.
Goss, I. J. M., Ga.
*Gould, Alvin W., Mich.
*Grallon, Frank, N. Y.
Gray, Thomas, N. Y.
Green, E. H., Ind.
Greenawault, J., Pa.
Gridley, F. D., N. Y.
Gudger, D. M., N. C.
Haines, E. C., N. J.
Hallman, J. S., Pa.
Hambright, J. B. O., S. C.
Hanne, J. W., Germany
*Hargreaves, T. W., Pa.
Hargreaves, William, Pa.
Harper, Henry, Pa.
Harris, E. N., Mich.
Harshberger, W. F., Pa.
Hart, H. Clay, Ohio
Harvey, J., ——
Harvey, J., Pa.
Harvey, Leander, Canada
Hassinger, Albert, Pa.
Hastings, E. H., Pa.
*Hathaway, Isaac, Pa.
Haurerman, A. D., Ga.
Hawley, James A., N. Y.
Healon, Charles E., N. J.
Helier, Rev. William, Eng.
Henry, Mad. A. U., France
Henszey, S. C., Del.
Heritage, J. S., N. J.
Herman, J. A., Germany
Hicks, Darius, R. L.
Hinkle, George, Pa.
Hill, William, N. Y.
Holbrook, C. N., Pa.
Holcomp, H. C., Ohio
Holden, L. P., Mass.
Holland, A., Pa.
Hoogland, A., N. Y.
Hopwood, M. W., Iowa
Horne, W. T., N. Y.
Howe, Joseph S., Pa.
Hubbard, H., Ohio
Hubbell, R., N. J.
Hugg, S. N., N. J.,
Hulburt, F. B., Pa.
Hurlburt, J. E., Ill.
Hurlburt, M. J. E., Ill.
Hunt, R. S., Pa.
Hunt, W. R., Pa.
Hunter, H. T., Ohio
Hunter, John, Mich.
Huntsinger, Abram, Ind.
Hutchins, George W., Pa.
Hutchinson, J. W., Ind.
*Hyde, Anna M., Pa.
Hylton, S. C., Pa.
Ingraham, S. C., Pa.
Irwin, J. G., Ohio
Iszard, W. H., N. J.
Jack, W. Lindsay, Pa.
Jacobus, P. N., N. J.
Jacoby, Frederick, Pa.
Jacoby, George F., Pa.
Jahncke, George F., N. J.
Jolley, L., Iowa
Jones, C. C., Ill.
Jones, William B., Pa.
Johnson, C. C., N. Y.
Johnson, J. P., N. Y.
Johnson, S. F., N. J.
Jordon, S., N. Y.
Judd, H. H., Wisconsin
Kammerer, A. C., N. Y.
Karsner, Charles W., Pa.
*Kaye, John, Pa.
Keith, George W., Mass.
Keller, H. D., Pa.
*Kellog, M. G., Cal.
Kemp. G. H., Ohio
*Kenwendeshon, —— Canada
Kermott, J. W., Mich.
*Kernahan, Thomas C., Pa.
Keyser, George H., Pa.
Kierstead, C. W., Md.
Kilborn, H. A., Canada
Kilgore, James L., Del.
King, Robert L., Ohio
Kinsley, John, N. J.
Kisch, C. A., Pa.
Kisner, T. J., Ind.
Kline, R. H., Ind.
Klose, Harry, Germany
Kollock, W. M., Pa.
Kneeland, C., Phila.
Lace, J. J., N. J.
LaCossett, H. D., Pa.
Landry, S. F., Ind.
Lane, Charles J., Mich.
Lane, W. A., Mich.
Langdon, S. W., N. Y.
Langford, A. F., S. C.
Laning, J. T., Pa.
Lape, A. A., Pa.
Lawrence, E. W., N. J.
Leaming, J. H., Ohio
Levis, J. C., Pa.
Leslie, A. J., Ohio
Lewis, H. J., N. C.
Lewis, S. R. I., ——
Liebert, Henry, Pa.

Little, David H., Ala.
Livingston, J. F., Phila.
Livingstone, L., N. Y.
Loomis, D. A., N. Y.
Loomis, D. A., Pa.
Louther, James M., Phila.
Lucas, W. H. G., N. C.
Luks, E. C., Pa.
Lunn, B. V., Texas
Lunney, John, Pa.
Lutes, W., Canada
Mahon, John A., Va.
Mahon, O. P., Ind.
Major, William, Pa.
Malone, D. R., Ind.
Maloney, Nelson, Ill.
Mandeville, E. M., N. Y.
Manly, Orville, Ohio
Mann, J. H., Pa.
Mansfield, J. LeRoy, Pa.
Mansfield, M., Pa.
Marple, S. W., N. J.
Marriott, G. W., Pa.
*Marsataine, Ed. C., Pa.
Martin, A., Pa.
*Martin, Edwin T., Mich.
Martin, S. J., Vt.
Mason, S. A., ——
Masterson, J. T., Ala.
Matthews, W. H., Pa.
May, Z. K., N. Y.
McBride, W., Pa.
McClintock, J. R. B., Pa.
McConnehey, David, Ind.
McCormick, H. C., Md.
McCourt, F., Pa.
McCregor, W. D., Ohio
McDonald, A., Mass.
McDougal, E., N. Y.
McKay, J. L., N. C.
McKee, J. L., Pa.
McKenzie, J. H., N. S.
McKinley, H. C., Pa.
McKnight, W. J., Pa.
McLaughlin, J. H., Pa.
McLaughlin, R., Canada
McLean, Hugh, Mass.
McQuillan, Robert, Canada
Meacham, J. D., Ohio
Meals, Isaiah, Pa.
Mease, I. W., Pa.
Mease, Urban J., N. Y.
Mease, U. G., Pa.
Merrell, W. S., Ohio
Meyer, F. L., Germany
Meyer, W. A., Germany
Meyers, J. C., Ohio
Meyers, W. H., Pa.
Michener, J. C., Pa.
Miller, E. Calvin, Pa.
Miller, George M., Pa.
*Miller, Louisa P., Mass.
Miller, Thomas E., Pa.
Minor, A. G., Mo.
Mitchell, Isabel M., Pa.
Morgan, H. A., Va.
Moore, Walter, C., Va.
Moorehouse, Eli M., Mont. Ter.
Morrill, F., Mass.
Morris, A. J., Pa.
Morrison, Joseph, Canada
Mosher, Thomas J., Ohio
Mountain, W. S., Pa.
Murphy, T. W., Pa.
*Musgrave, Simpson, Md.
Nafe, G. W., Ind.
Nance, A. L., Ga.
Newell, James, Canada
Newton, A. W. R., Mass.
Nicholas, A. B. C., S. C.
Nintzel, R. N., Pa.
Nixon, T. F., N. C.
Noetling, John, Pa.
Nunez, G. De La, Cuba
O'Conner, B. R., Ind.
Oldshue, J. L., Pa.
Oldshue, T. L., Pa.
Oligg, C., Pa.
Oliver, Andrew, Pa.
Ordway, B. H., Me.
Orr, Samuel L., Pa.
Parker, J. H., N. C.
Patton, J. B., Pa.
Payne, Ed., Canada
Peck, H. E., N. J.
*Peebles, J. M., N. J.
Peirce, R. V., Pa.
Pemberton, T., England
Perkins, T. Spencer, Mass.
Perpente, F. C., Pa.
Pierce, J. O., Del.
Pierce, T. O., Del.
Pingree, M. G., Pa.
Pinkard, G. W., Tenn.
Piper, H. D., Pa.
Plowman, M. S., Pa.
Pope, E. D., N. Y.
Porter, A. C., N. Y.
Porter, C. M., Pa.
Pratt, D. L., Pa.
Prentzenger, Jacob, Ohio
Preston, M. M., Pa.
Prettyman, E. K., Del.
Price, Henry C., Ohio

Price, M. F., Ill.
Prondley, G. W., Pa.
Proten, D. A., ——
Pugh, Reece, Pa.
Purviance, I. F., Ohio
Radway, J., N. Y.
Ramsey, Robert, Ohio
Rankin, G. T., Pa.
Rauth, H. L., Texas
Reasner, F. M., Mich.
Record, Henry A., Pa.
Reifsnyder, F. B., Ohio
Remington, W. B., N. Y.
Reynolds, B. F., Iowa
Reynolds, J. T., N. Y.
Reynolds, Richard, Pa.
Richards, Marshall B., N. H.
Richmond, S. H., Ill.
Rinehart, S., Mich.
Roberts, Charles B., Cal.
Roberts, J. J., Pa.
*Roberts, J. L., Fla.
Robillard, Edmund, Canada
Robinson, Newton, N. C.
Robinson, W. P., Ohio
*Robinson, Winfield S., Ohio
Rogers, George H., Ohio
Rogers, H. N., Wisc.
Rogers, Matthew, Maine
Rogers, S., Pa.
Roney, W. C., Pa.
Rose, Charles H., Md.
Rosegen, P., Ind.
Rosenstein, Simon, Pa.
Rosman, John, N. Y.
Ross, A. M., Canada
Rotheack, Isaac, Pa.
Rounseveil, A. P., N. Y.
Rowley, E. F. S., S. C.
Ruggles, Silas, Mass.
Rutley, J. H., N. Y.
Ryan, Charles, Pa.
Salisbury, E. E., N. Y.
Saunier, J. B., Pa.
Sawyer, Alzamnia, R. I.
Sayers, Kohn B., Ohio
Scott, J. W., N. J.
Seydler, Aug. G. A., Germany
Sharkey, William P., Pa.
Sharpless, B. F., Pa.
Shaw, W. W., Pa.
Sheppard, F. V., Pa.
Sherburne, S., N. Y.
Sherry, P. F., Pa.
Short, R. N., Pa.
Showalter, J. W., Va.
Shreve, Joseph, N. J.
Shultz, A. W., Pa.
Shuman, S. F., Md.
Silberberg, Carl L., Germany
Simmons, P., N. Y.
Simms, E. T., Ala.
Sitherwood, G. D., Ohio
Smith, F. B., Mich.
Smith, F. D., N. Y.
Smith, Rev. I., Mass.
Smith, J. K., Pa.
Smith, J. S., Bermuda
Smith, S. C., N. Y.
Smith, S. F., N. Y.
Smith, W. B., Pa.
Smedley, A. H., Mass.
Smedley, W. S., Pa.
Snyder, G. J. B., Ohio
Southworth, O. L., N. Y.
*Spear, Caroline H., Pa.
Spring, John V., Miss.
Sprogle, S. H., Pa.
Squire, A. G., Ohio
Stamm, Martin, Ohio
Stanger, Levi P., N. J.
Stanton, J. H., Pa.
St. Clair, Isaac, Pa.
Steachman, George W., Pa.
Stebbins, Loring C., Ohio
Steere, W. B., Indiana
Stevens, A. H., Pa.
Steward, C., Ohio
*Steward, Mary, Pa.
Stewart, J. W., Mich.
Stiles, James E., Pa.
Stiles, O. D., Pa.
Stolz, J., Ohio
Stoner, William Bruce, Pa.
Stratford, H. K., Ill.
Stratton, Albert G., Pa.
Stuard, Edward S., Pa.
Stuart, T. H. D., La.
Sturgis, George E., Pa.
*Sullivan, James G., Md.
Summers, H. A., Canada
Surface, Corn., Ohio
Swager, G. N. W., Mich.
Tasting, Robert, Pa.
Tate, F. M., Iowa
Taubner, Carole, ——
Taylor, Alonzo C., N. Y.
Taylor, Morton J., Ohio
Taylor, Pardon F., Mich.
Taylor, W., Pa.
Taylor, Win., Pa.
Terry, I. C., Pa.
Terry, M. F., Pa.
Thayer, Eli Jr., Mass.

Thomas, I. C., Pa.
Thomas, J. S., Ala.
Tobin, Charles, Conn.
Tomlinson, J. J. W., S. C.
Town, Edwin C., Pa.
Townsend, George D., R. I.
Treskow, Hans, N. Y.
Tucker, Charles A., Mass.
Tucker, H. A., Pa.
Tuttle, Hon. G. M., Ohio
Tuttle, Marcus E., Mass.
Van Marter, John S., N. J.
Vannaten, R., Pa.
Van Vranken, C. D., N. Y.
Vast, P. F., N. J.
Vinton, J. D., Mass.
Von Cairna, D. B., Eng.
Wade, Hamilton, Mo.
Walker, H. F., Ga.
Walker, T. H., Pa.
Wallihan, S. S., Wisc.
Waltman, William, Pa.
Warren, Guy, Ohio
Waters, T. P., Canada
Watson, H., Mich.
Watts, H. M., Maine
Weaver, Rufus B., Pa.
Weems, R. L., Pa.
Wehr, S. F., Pa.
Wertz, Taliaferre, Ind.
West, James D., Del.
Westcott, T. D., N. J.
Weston, A. C., N. H.
Wheeler, John D., N. Y.
Whisler, Simon M., Pa.
Whitcher, T. D., Canada
White, D. M., Ga.
Wiggins, E. S., Canada
Wilber, John H., N. Y.
Wilbur, E. W., Ill.
Wilcox, M., Pa.
Wilder, Charles, Ill.
Wiles, W., Ohio
Wiley, B. F., Mich.
Wilford, J. B., N. Y.
Williams, C., Minn.
Williams, J., Pa.
Williamson, Charles M., Pa.
Wilkin, Walter G., N. Y.
Wilkinson, J. M., Canada
Wilson, G. W. S., Pa.
Wolf, A. K. W., Germany
Wolf, N. B., Mass.
Wolfe, Charles L., Pa.
Wood, G. W., Canada
*Wooster, Elwood E., Pa.
Wright, L. B., Ohio
Wright, George, N. J.
Wright, W., N. J.
Wychoff, W. W., N. J.
Young, J. D., Mass.
Younghusband, L., Mich.

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BIBLIOGRAPHY

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2. Editorials:
   (a) Boston Medical and Surgical Journal, Volume 103 (1880), pp. 17 and 353–4.
   (b) New York Times (reprinted in the PHILADELPHIA RECORD of June 15, 1880).

Report of the Secretary for the Year Ended December 17, 1963

Stated Scientific Meetings:

		(Attendance)
January	The Forty-seventh Nathan Lewis Hatfield Lecture Harry F. Dowling, M.D.	77
February	The Eighty-fourth Mary Scott Newbold Lecture Theodore E. Woodward, M.D.	79
March	The Seventy-fifth Thomas Dent Mütter Lecture Arthur P. Stout, M.D.	129
April	The Eighty-fifth Mary Scott Newbold Lecture Richard A. Kern, M.D.	121
May	At the Philadelphia County Medical Society: Presentation of the Strittmatter Award to John H. Gibbon, Jr., M.D., by George Willauer, M.D. Presentation of Certificates to Physicians who have completed fifty years in the practice of medicine, by Malcolm W. Miller, M.D., Chairman, Board of Trustees, Pennsylvania Medical Society.	150
October	The Twenty-third Alvarenga Prize Lecture Rupert E. Billingham, D.SC., F.R.S.	165
November	Joint Meeting with the Philadelphia County Medical Society. The Forty-eighth Nathan Lewis Hatfield Lecture Prof. H. C. Burger, D.SC.	35
December	The Forty-third James M. Anders Lecture Michael B. Shimkin, M.D.	57

Regular Business Meetings

	(Total Ballot)
January 2, 1963	207
February 6, 1963	247
March 6, 1963	257
April 3, 1963	246
May 15, 1963	282
October 2, 1963	244
November 6, 1963	226
December 4, 1963	303

The College of Physicians of Philadelphia awarded the Alvarenga Prize Award on July 14, 1963, to Rupert E. Billingham, D.SC., F.R.S., for his outstanding work on tissue transplantation immunity and immunological tolerance.

Sections of the College

	(*Membership*)
Ophthalmology	71
Otolaryngology	53 & 3 Honorary
General Medicine	141
Public Health, Preventive & Industrial Medicine	75
Medical History	130

	Fellow	Non-Res.	Assoc.	Honorary Foreign	Honorary U. S.	Hon. Assoc.	Total
December 18, 1962	1059	143	0	3	4	2	1211
Died during year	14	5					19
Resigned	5	2					7
Elected	56	1					57
Transferred from Resident to Non-Resident	−5	+5					
Transferred from Non-Resident to Resident	+3	−3					
Failed to qualify	1						1
Forfeited	2	1					3
December 17, 1963	1091	138	0	3	4	2	1238
Life Membership							
New Type							
Under 70	23	5					
Over 70	32	8					
Old Type (Commutation dues)	7						
	62	13					
Dues Remitted:							
Before 1963	31	7					
During 1963	8	0					
	39	7					
Annual Contributors as of December 17, 1963	990	118					

WILLIAM A. STEIGER, M.D.
Secretary

Report of the Treasurer for the Year Ended November 10, 1963

ASSETS

General Fund:		
Cash in bank and on hand—overexpended		($17,302.63)
Maintenance and Reserve Fund:		
Cash in bank	$5,945.03	
Investments	29,188.74	
		35,133.77
Interns and Residents Revolving Loan Fund:		
Cash in bank (savings accounts)	19,000.00	
Securities	10,002.19	
		29,002.19
Library Historical Collections Fund:		
Cash in bank		98.29
Special Contributions for Use of the Library:		
Cash in bank—overexpended		(9.75)
Trust Funds:		
Uninvested principal cash	36,994.46	
Uninvested income cash (restricted)	16,804.36	
Mortgage	33,750.00	
Real estate	158,905.33	
Bonds	393,318.40	
Preferred stocks	280,582.17	
Common stocks	403,188.22	
		1,323,542.94
Plant Fund:		
Land—16-25 South 22nd Street	95,000.00	
Building	1,420,747.93	
Furniture and fixtures	1.00	
Deposits on perpetual fire insurance policies	11,462.28	
		1,527,211.21
		$2,897,676.02

Funds			
General Fund:			
Library general account		$12,109.57	
Library medical documentation service		155.24	
Life membership—uninvested funds		395.00	
Reserve for contingencies—uninvested funds		190.02	
Greater Philadelphia Committee for Medical-Pharmaceutical Science		8,392.26	
Unexpended operating fund balances:			
Current operations—overexpended	($40,341.46)		
Committee on Interns and Residents	717.89		
President's Room	525.00		
Books	413.61		
Rare books	100.00		
Campaign expense	115.95		
Portrait	126.47		
Harvey's "De Motu Cordis" Facsimile	(202.18)		
		(38,544.72)	
			($17,302.63)
Maintenance and Reserve Fund—principal			35,133.77
Interns and Residents Revolving Loan Fund—principal			29,002.19
Library Historical Collections Fund—principal			98.29
Special Contributions for Use of the Library—principal			(9.75)
Trust Funds:			
Principal net worth			
Discretionary common trust fund	1,233,916.08		
Legal common trust fund	24,097.94		
Trust funds not pooled	14,974.56		
Fund for purchase of units in discretionary common trust fund	33,750.00	1,306,738.58	
Income net worth			
Discretionary common trust fund	13,575.79		
Legal common trust fund	1,115.33		
Trust fund not pooled	2,113.24	16,804.36	
			1,323,542.94
Plant Fund—principal net worth			1,527,211.21
			$2,897,676.02

Notes: The various fund investments are shown at their recorded values, which values substantially represent cost.

General Fund

STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS

November 10, 1962 to November 10, 1963

Receipts:			
Income on investments, net of agents fees:			
Trust funds	$76,615.54		
Less:			
Amount transferred to income of the several restricted trust funds $11,515.42			
Erlanger Garage expenses paid 7,689.66	19,205.08		
	57,410.46		
Add: income transferred from Erlanger Garage to DCTF in excess of profits earned by garage	482.43	$57,892.89	
Income from funds, principal of which is not administered by College	2,485.16		
Less, amount transferred to income of a restricted fund	455.71	2,029.45	
Interest on mortgage	1,582.03		
Income on other investments	1,009.77	2,591.80	$62,514.14
Contributions:			
Fellows dues		59,411.50	
Life membership		1,698.00	
Use of hall and projector, including Ghana project		5,659.00	
For general expenses in the library		5,202.84	
For purchase of rare books		100.00	
For Greater Philadelphia Committe for Medical-Pharmaceutical Science		8,500.00	80,571.34
Transfers from other funds:			
For reducing deficit in current operating accounts:			
Miscellaneous Contributions Fund		4,446.87	
For covering deficit of Entertainment Committee:			
W. Weir Mitchell Entertainment Fund		669.41	5,116.28
			148,210.76
Library:			
Contribution plan	21,319.35		
Photostats, fines, etc	34,211.48	55,530.83	
Medical documentation service		26,949.26	82,480.09
Miscellaneous			1,906.24
Total receipts			232,588.09

Disbursements:			
Operating expenses:			
Hall Committee		$41,378.36	
Office of the Secretary		8,495.64	
Office of the Treasurer		12,148.88	
Pensions		4,671.37	
Campaign expenses		10.00	
Publication Committee		7,860.25	
Books		2,495.16	
Entertainment Committee		2,199.17	
College Collections Committee		4,123.55	
Committee on Interns and Residents		2,450.77	
Library			
Salaries	$97,571.07		
Books, journals, supplies, etc.	39,329.73		
		136,900.80	
Medical documentation:			
Salaries	22,821.05		
Other expenses	3,972.97	26,794.02	
General funds used to purchase units in Discretionary Common Trust Fund for Pension Reserve Fund		417.77	
Purchase of rare books		152.96	
Friends of Library		20.00	
Greater Philadelphia Committee for Medical-Pharmaceutical Science		107.74	
			$250,226.44
Excess of disbursements over receipts			(17,638.35)
Cash balance, November 10, 1962			335.72
Cash balance, November 10, 1963			($17,302.63)

STATEMENT OF COST OF INVESTMENT UNITS PURCHASED IN DISCRETIONARY COMMON TRUST FUND BY THE GENERAL ENDOWMENT FUND

November 12, 1962 to November 11, 1963

Balance, November 12, 1962			$417,989.42
Receipts:			
Entrance contributions		$2,100.00	
Voluntary contributions from Fellows, etc		1,235.00	
Book of Remembrance		258.00	
Amortization of mortagage—13th and Locust Streets		2,250.00	
Transfer from unit adjustment account		20.54	
		5,863.54	
Less: Amount insufficient to purchase one unit, credited to unit adjustment account		9.64	5,853.90
Balance, November 11, 1963			$423,843.32

BY THE COLLEGE EXTENSION FUND
November 12, 1962 to November 11, 1963

Balance, November 12, 1962		$3,293.47
Receipts:		
Voluntary contributions from Fellows	$275.00	
Income earned on invested principal	150.45	
	425.45	
Less: Amount insufficient to purchase one unit, credited to unit adjustment account	14.65	
		410.80
Balance, November 11, 1963		$3,704.27

BY THE RESTRICTED ENDOWMENT FUNDS
November 12, 1962 to November 11, 1963

Discretionary Common Trust Fund		
Balance, November 12, 1962		$626,937.19
Receipts:		
S. Weir Mitchell Associates journal fund	$29,307.43	
Life membership fund	777.39	
Pension reserve fund	1,007.68	
Laura Lane fund	11,323.88	
Transfers from unit adjustment account:		
S. Weir Mitchell Associates journal fund	20.54	
	42,436.92	
Less: Amounts insufficient to purchase one unit, credited to unit adjustment account	26.87	
		42,410.05
Balance, November 11, 1963		$669,347.24
Discretionary Common Trust Fund		
Balance November 11, 1963		1,096,894.83
Legal Common Trust Fund		
Balance November 12, 1963 (no change during year)		23,500.00
Trust Funds Not Pooled		
Balance November 11, 1963 (no change during year)		14,974.56
Total restricted endowment funds, November 11, 1963		$1,135,369.39

KENDALL A. ELSOM, M.D.
Treasurer

Annual Report on the Library*

Administrative

Advances in Regional Libraries. Previous annual reports have discussed library cooperation in the Philadelphia area and the regional library function performed by the Library of the College of Physicians of Philadelphia. Other voices in other parts of the country have been describing similar developments this year and these voices have focused attention on the need for state and federal support of regional libraries which are essential for effective communication of medical information throughout the United States.

In Philadelphia, the formation of a joint committee representing many institutions promises fuller development of the potentials of the College Library.

In the beginning. Dr. John Morgan's gift of 24 volumes to the original 24 Fellows in 1788 effected an economy for the Fellows, but the gift was expensive for him. The principle is unchanged today when 1300 Fellows support a comprehensive library which is the keystone for a multitude of smaller libraries in a host of local institutions. Only about twelve and one-half per cent of the library's costs are received from sources outside the College itself. The relative weight of the burden has been increased many fold by the incredible growth of medical literature since the time of Dr. Morgan.

Today, 175 years later, the College Library houses over 200,000 bound volumes, 300,000 pamphlets, dissertations and reports, and maintains over 2,600 current medical journal subscriptions. This year 20,000 visitors came to the Library, 13,381 volumes were loaned to 288 institutions in 33 states, and 95,000 pages of medical text were photocopied for the convenience of readers. As Fellows themselves become a smaller and smaller proportion of the library's clientele, they are asked to make increasingly generous contributions to the College Library's support.

The tide turns. This year's report will review the series of new developments which provides solid hope for broader base of support for the College Library. Both locally and nationally, there is an increasing awareness of the importance of regional medical library facilities which augment the resources and services of the National Library of Medicine.

The Philadelphia Deans. The National Library of Medicine commissioned Mr. Harold Bloomquist, Assistant Librarian of the Harvard Medical School, to report on the status and needs of medical school libraries in the United States (1). Early in the year, the Committee of the Deans of the five Philadelphia medical schools asked their librarians for an evaluation of their libraries in terms of the Bloomquist report. A meeting of the medical school and College of Physicians librarians produced a memorandum which, while it agreed fully with Bloomquist's expressed need to strengthen all medical libraries, pointed to specific resources (Philadelphia Union Library Catalogue and the Library of the College of Physicians) in Philadelphia which would modify some of his recommendations as far as this city is concerned. On the other hand, specific weaknesses in Philadelphia medical library practice (inadequate space and subject coverage, insufficient professional personnel, limited and varying service capabilities) were mentioned. The memorandum concluded that the inter-dependence among medical libraries argued for increased financial support not only for the medical school libraries, but for the College of Physicians Library as well.

Harvard meeting. Later in the year a meeting of medical librarians from several regions of the country was convened at Harvard. This meeting emphasized the federal government's growing interest in the soundness of the cen-

* November 1, 1962–October 31, 1963.

tral medical library resource within a given region, an interest which (hopefully) will be backed by dollars for regional libraries throughout the United States. A Philadelphia Plan (2) approved by the five medical school librarians and the College of Physicians, went along the plans from Nebraska, New Haven, Boston, Wisconsin and New York, to the Director of the National Institutes of Health.

Bethesda consultation. Regional library representatives met again in April at the National Library of Medicine. Pending and proposed legislation was reviewed but no specific provision was found for financial support of regional services. Legislative thinking has been limited so far to medical schools and to construction funds. A report that the Surgeon General was preparing a bill to give his department the broader authority necessary to include regional library support, raised hopes further. The suggestion was made that an officer or committee of the Medical Library Association might assist in the preparation of pertinent legislation.

Medical Library Association. In June, during the sessions of the Second International Congress on Medical Librarianship at Bethesda, a newly-created Federal Relations Committee met to discuss the Association's responsibility for keeping the government informed on its position on federal action relating to medical libraries. The Librarian of the College of Physicians agreed to serve on this committee, which is preparing a policy statement to serve as the basis for testimony before Congressional committees and federal agencies.

Other voices. Arguments for broader bases of support for such regional extension services as are now being offered by the College of Physicians have come from a variety of sources. The Regents of the State of New York have approved a special appropriation for further study of a report by Mr. Ralph Esterquest (3) recommending that the state pay the New York Academy of Medicine and the New York Public Library to serve as reservoir libraries furnishing loans to medical libraries throughout the state.

At the opening session of the Second International Congress on Medical Librarianship, Luther L. Terry, M.D., Surgeon General of the U. S. Public Health Service, observed that "absolute self-sufficiency in library resources has come to be recognized as an illusion. No single library can identify, collect, preserve, and make available all the materials in biomedicine and its many related sciences. Under these circumstances, the necessity of cooperation is evident. What one library cannot accomplish alone, can be achieved, or at least facilitated, by a cooperating group of libraries" (4).

At the same Congress, Miss Elizabeth L. Keenan, Senior Librarian of the Downstate Medical Center Library (N. Y.), proposed that "libraries which lend more than two percent of their total circulation to outside institutions should be eligible for federal support of interlibrary loan service" (5). In his discussion of "Medlars and the Library Community" (6), Mr. Scott Adams anticipated the possible impact of mechanized indexing and projected decentralized output through the distribution of magnetic tapes. He predicts that the pressures of this development will result in "an effort to develop library resources nationally so that they may meet the increased demands which machine retrieval will evoke. This will require national planning involving reconsideration of regional library centers, and better measures for testing the adequacy of local collections." Mr. Adams assures us that the advent of decentralized Medlars output will mean that "the medical library, serving as both central repository and the central switching mechanism, will be in a position to serve areas of research far more effectively, and with recognition of this circumstance will come renewed confidence and support."

Philadelphia again. At the instigation of Dean Marion Fay of the Woman's Medical College of Pennsylvania, the Philadelphia medical schools Deans' Committee asked the President of the College of Physicians of Philadelphia to appoint a committee to seek means of establishing certain central facilities which

could be shared by the five medical schools and other medical organizations. This committee was appointed after the close of the library year covered by this report.

The future. All portents seem to augur well for the continuing expansion of medical library service to the Philadelphia region. New libraries are being planned for Hahnemann Medical College, Jefferson Medical College, Temple University School of Medicine, and the University of Pennsylvania School of Medicine. New hospital libraries are under study, and pressure grows for the improvement of existing facilities. It is generally recognized that the College of Physicians of Philadelphia cannot long continue the deficit financing of the last two years to provide medical library services to the community. Many organizations are already voluntarily sharing the expenses of the College's regional services but even broader participation must be stimulated. The supplementation of the country-wide services of the National Library of Medicine by the College of Physicians of Philadelphia at the regional level is operating to the benefit of medical schools, hospitals, pharmaceutical companies, and both local and federal government agencies. The wind is right, the tide is at the flood. Surely the opportunity for fruitful service to the medical community will not be lost.

The College Library in 1962/63

Personnel. This was the first full year the Library enjoyed the services of an Assistant Librarian whose time was devoted exclusively to administrative activities. Miss Mary E. Feeney, previously Librarian of the Hospital of the University of Pennsylvania, accepted the Assistant Librarianship of the College at the beginning of the current report year. Her previous administrative experience and her natural talent for working with people have given the library administration a new sense of direction.

The Upstate Medical Center in Syracuse called the Library's Reference/Circulation Librarian, Miss Marcia Davidoff, to newer fields of service. Fortuitously her position was filled by Miss Nancy Whitten, whose past experience includes posts at the New Haven Public Library, the Rare Book Department of the Free Library of Philadelphia, and a medical library internship at Emory University.

Mrs. Anna Siegers, the Cataloging Assistant, returned to her native Holland at the close of her husband's studies in this country. The duties in this department were reassigned and Mr. Edward Romasko, Jr. was promoted from a paging position into an assistantship in this department. Miss Mildred Gray assumed the duties of Library Secretary when Miss Carole Lynn Smith resigned to be married, after eighteen months library service. Mrs. Linda Margulies was employed during the summer as a book mender.

The increased photoduplication volume necessitated the addition of a position to the staff at the paging level.

The following individuals who are no longer on the Library Staff served as library pages during the report year: Charles Brown, Jr., Allen Kutner, Frank Arcaro, Christopher Beck, Steven Peitzman, Domenic Chiavaroli, and Francis Kelleher. In June, Mr. Philip Ballinghoff was promoted to the position of Senior Page. After the end of the current report year he was drafted into military service.

Intra-Mural Modifications. Several changes and additions to operating procedures were instituted during this report year. The monthly news note on the Book List attempted to keep Fellows informed of intra-mural activities of more than routine interest.

The Circulation System was modified from a two-card to a one-card system. This was accomplished with a minimum of inconvenience to our individual and institutional borrowers and achieved a simplified procedure for the Reference/Circulation Staff, thus reducing the time involved in performing routine charging and discharging of books.

Experimentation with an additional binder has increased the College Library's capacity to process journal materials promptly upon completion of individual journal volumes.

Trials of Mylar binding for a selected number of paper back monographs and serial titles were successful and increased the College Library's capacity for preserving its materials.

S. Weir Mitchell Associates. The continuing growth of S. Weir Mitchell endowments was most gratifying. Shortly after the close of the report year there were 112 titles which had been endowed in perpetuity. The Library Administration is particularly grateful to George I. Blumstein, M.D. who has persevered with this program, giving generously of his time and energy to make it a success. Mounted bookplates and legends suitable for framing have been sent to all but the most recently enrolled S. W. Mitchell Associates.

Extra-curricular activity. The Librarian enjoyed the privilege of discussing the literature of orthopedic surgery and dermatology with graduate medical students of Jesse T. Nicholson, M.D. and Samuel X Radbill, M.D.

The College Library was represented at the Second International Congress of Medical Librarianship by Marcia Davidoff, Mary E. Feeney, Elliott H. Morse, Marion I. Schmieder, Edith Wright, and Muriel Zeldis. The Librarian served on the Budget and Finance Committee of the Congress.

Philadelphia was close enough to the Congress city of Washington to attract a considerable number of overseas visitors before the Congress and again during the ten days immediately following it. The social and professional stimulation afforded by these medical librarian colleagues from the British Isles and the Continent contributed to the entire staff's sense of international medical endeavor. An extra bonus was offered later in the year in the form of a visit from Miss Muriel Evans, Deputy Librarian of the Royal College of Physicians in London. The homogeneity of interests of the two colleges made our discussions mutually enlightening.

Visitors. Freshman medical students from Hahnemann Medical College, Temple University School of Medicine, and the Woman's Medical College of Pennsylvania paid their annual visits to the College Library. Brief lectures by the Curator of the Library's Historical Collections, the Curator of the Mütter Museum, and the Librarian described the medical literature resources easily available to them to augment the facilities in their own schools.

Students from the Graduate School of Medicine of the University of Pennsylvania received a more detailed explanation of the College Library with emphasis on its non-English language journals and its acquisition of research monographs.

The Wistar Association held a "Wistar Party" at the College and permitted the Curator and the Librarian to tell the College story.

The Center for International Visitors sponsored two social evenings at the College of Physicians for foreign interns and residents. The Librarian and the Assistant Librarian participated in the program designed to acquaint these visitors with the resources of the Philadelphia area.

Other visiting groups included students from Clifton Heights High School and the senior biology class from Holy Family College.

New York Academy of Medicine. Four members of the Library's professional staff visited the New York Academy of Medicine Library to observe analogous departments and functions in that library. Warm hospitality and the benefits of comparable medical library experience were generously shared with members of the College Library staff.

MEDLARS symposium. The National Library of Medicine arranged a two-day meeting in Bethesda in April to acquaint medical librarians with the operation of MEDLARS and of what may be expected of it in the immediate and distant future. The College of Physicians was represented by its Librarian.

Research Associateship. During the year, five installments of a projected series of eight articles on "Extinct Medical Schools of Nineteenth Century Philadelphia" appeared in the *Transactions & Studies of the College of Physicians of Philadelphia.* The author, Harold J. Abrahams, PH.D., the first Research

Associate of the College of Physicians, received a grant from the National Institutes of Health, Division of General Medical Science to complete this study. The University of Pennsylvania Press plans to reissue these articles in book form. Laudatory comments from many parts of the country have demonstrated the value of this systematizing of previously unorganized biographical and administrative information.

Wood Room. The thoughtful interest of Mrs. Thomas M. Durant, the wife of the President of the College, combined with funds available in the H. C. Wood account permitted the redecoration of this room. A lovely old desk was refinished, new draperies were hung, a silver loving cup given to Dr. Wood by his friends and pupils in 1902 was repolished, and a tasteful arrangement of artificial flowers was purchased.

B.W.L. Foundation. A donation of $200.00 for the purchase of books for the Library was received from the B.W.L. Foundation.

Professional Staff Activity. The 64th Annual Meeting of the Medical Library Association in Philadelphia in 1965 will add considerably to the professional duties of all Philadelphia area medical librarians. Convention committee assignments have been accepted by Mrs. Kathryn Miragliotta, Mrs. Marion Schmieder, Miss Nancy Whitten, Miss Edith Wright, and Miss Muriel Zeldis. The Librarian and the Assistant Librarian have been named Chairman and Co-Chairman of the Convention Committee.

Miss Mary E. Feeney continues to serve as Consultant to the Hospital of the University of Pennsylvania Library. The Philadelphia Regional Group of the Medical Library Association was served by Miss Marcia Davidoff as its Membership Committee Chairman and by Miss Edith Wright as a member of its Program Committee.

Benefactors. A list of donors of books and other library materials appears in the statistical section of this report.

The Library acknowledges its gratitude to the following institutions which have shared the operational costs of the College Library.

NON-PROFIT INSTITUTIONS

Bryn Mawr Hospital Medical Staff
Eagleville Sanatorium
Fitzgerald-Mercy Hospital
Graduate School of Medicine of the University of Pennsylvania
Hahnemann Medical College
Harrisburg Hospital
Institute for Cancer Research
Jefferson Medical College
Lankenau Hospital
Philadelphia General Hospital
Seton Hall College of Medicine and Dentistry
Temple University School of Medicine
U. S. Naval Hospital Staff, Philadelphia
University of Pennsylvania School of Medicine
University of Pittsburgh School of Medicine
Walson Army Hospital Staff
Woman's Medical College of Pennsylvania

COMMERCIAL INSTITUTIONS

Air-Shields, Inc.
Atlas Chemical Corporation
Baltimore Biological Laboratories
Beasley & Ornsteen
Bell Telephone Company
Bernstein, Bernstein, Levy and Harrison
Biological and Medical Services
Borden Company—Chemical Division
Campbell Soup Company
Dechert, Price & Rhoads
Dilworth, Paxson, Kalish, Kohn & Dilks
Dorfman, Pechner, Sacks & Dorfman
Duane, Morris & Heckscher
E. I. du Pont de Nemours, Haskell Laboratory
E. I. du Pont de Nemours, Lavoisier Laboratory
E. I. du Pont de Nemours, Stine Laboratory
F. M. C. (American Viscose Corp.)
F & M Scientific Corp.
Freedman, Landy & Lorry
General Electric Co., Missiles & Ordinance Systems Department
Gray & Rogers
Halbert & Kanter
Institute for Scientific Information
Kontes Glass Company
La Wall & Harrisson
Lederle Laboratories
Lee Ramsdell & Company
Lemmon Pharmacal Company
Lewis & Gilman, Inc.
MacAndrews & Forbes Company
McNeil Laboratories
Mead Johnson & Company

Medical Literature, Inc.
Merck Sharp & Dohme, Rahway
Merck Sharp & Dohme, West Point
Mobile Oil Company
Morgan, Lewis & Bockius
Mulford Colloid Laboratories
National Drug Company
Norwich Pharmacal Company
Ortho Research Foundation
Pennsalt Chemical Corp.
Pennsylvania Railroad Company
Pepper, Hamilton & Sheetz
Chas. Pfizer & Company, Inc.
Philco Corp.
Prudential Insurance Company
Quaker Chemical Products Corporation
Radio Corp. of America
Richter, Levy, Lord, Toll & Cavanaugh
Rittenhouse Book Store
Rohm & Haas Company
William H. Rorer, Inc.
Samson Laboratories
Schnader, Harrison, Segal & Lewis
Scientific Information Services, Inc.
Scientific Literature Consultants
Smith, Kline & French Laboratories
Squibb Institute for Medical Research
Sun Oil Company
Arthur H. Thomas & Company
Tobacco Industry Research Committee
Wallace Laboratories
Wyeth Laboratories

E. H. M.
M. E. F.

Historical

The work of Miss Edith A. Wright, Cataloguer for Historical Materials, and her typing assistants, during their first full report-year, may be summarized statistically as follows:

	Catalogued	*Re-catalogued*
Books	268	16
Pamphlets	804	94
Letters	786	
Mss.	82	
Pictures	208	
Misc.	147	1
Totals	2,295	111

Cards typed: 9,196
Cards corrected: 2,985

It will be realized that this represents descriptive cataloguing, cataloguing that seeks to uncover and bring forward every capacity of the given historical item to serve historical research. The statistics, in turn, bring together recent gifts and purchases, as well as older inhabitants come upon by chance—eminently worthy, but hitherto neglected. No systematic attempt has yet been made to reach this last class, because of the extent of the materials that lay readily at hand. Among these may be mentioned two large donations received from the libraries of, respectively, the Hahnemann Medical College and Hospital of Philadelphia, and the Woman's Medical College of Pennsylvania. These two collections, added to extensive materials already in our collections, place the library in a very gratifying position in relation to the historical literature on homeopathy and on venereology.

An interesting illustration of the fruits of alert historical cataloguing may be cited. A valued document in the history of ether-anesthesia is the Testimonial of members of the medical profession of Philadelphia, New York, and Boston on behalf of William T. G. Morton, published in Philadelphia in 1860. The writers of the several testimonials are not identified in the pamphlet, nor in any listing of the pamphlet known to us. Pasted in a copy which Miss Wright was cataloguing is a long folding sheet, at the head of which is printed the Philadelphia testimonial; below, are facsimile signatures of the signers. Had she not unfolded the folds, she would not have come across two interesting holograph notes: 1) "written by me in Feb. 1860, Edward Hartshorne, May 11 '83"; 2) "S. W. insisted on me signing first as the writer of this paper, E. H." Thus was uncovered, seemingly for the first time, the fact that the writer of the Philadelphia testimonial was the distinguished physician and surgeon Edward Hartshorne (1818–85), who, as it happened, in 1860 was secretary of this College. Since S. Weir Mitchell was one of the signers of the testimonial, there can be little doubt that it was he who persuaded the author to be the first to affix his signature.

Some Rariora—Majora et Minora

Basilius Valentinus. Of natural and supernatural things. London, Moses Pitt, 1670.

(Presented by Miss Sarah A. G. Smith, through Mr. Walter L. Bethel. Edition not recorded in Ferguson or Duveen, the latter of which incorrectly claims that its 1671 edition is the first English one. Wing records only two copies of the 1670 in this country: Library of Congress; Harvard.)

Caius, Joannes. De canibus britannicis. London, 1570. (The *S.T.C.* records six copies of this work by the eminent scholar-physician; the check-list of American copies records four other copies in this country.)

Cassebohm, J. F. Tractatus quatuor anatomici de aure humana, Magdeburg, 1734—bound with the 5th and 6th *Tractatus*, published in the following year. (Garrison-Morton 1547; "Important tracts on the anatomy and physiology of the ear.")

Celsus. De medicina. (Twenty-three editions —3 of the 16th c., 5 of the 17th, 6 of the 18th, and 9 of the 19th—printed, respectively, in Amsterdam, Basel, Edinburgh, Jena, Leipzig, Leyden, London, Lyon, Milan, Padua, Paris, Venice, Verona, and the Monastery of Westphalia. While the great majority of the editions are in Latin, of course, translations into Italian and English are also represented. The Amsterdam, 1685, edition duplicates a copy already in the library, but bound with it is a copy of the Pharmacopoea of Utrecht, 1664, which the library did not have in any edition. The acquisition of this collection was made possible by the fund recently established for such purposes by our Fellow Dr. J. Monroe Thorington.)

Dioscorides. Acerca de la materia medicinal y de los venenos mortiferos, traduzido . . . por Andreas de Laguna. Anvers, Juan Latio, 1555. (Pritzel 2313; Nissen 500. The first edition in Spanish.)

Mesue. I libri . . . dei semplici purgativi. Venice, 1589.

Morellus, P. Methodus praescribendi formulas . . . Geneva, 1650.

Neubauer, J. E. Descriptio anatomica nervorum cardiacorum. Frankfurt, 1772.

Perrone, P. Trattato di medicina legale. Parte civile. Naples, 1826.

Regime de vivre tresutile et necessaire. Paris, 1566.

Rush. Samuel. Discourse on the moral influence of sounds. Phila., 1839. (Samuel Rush (1795–1859) was the twelfth child and seventh son of Dr. and Mrs. Benjamin Rush. Presented by our Fellow Dr. William G. Leaman, Jr.)

The above represents but a fraction, of course, of the historical materials that came into the library from one source or another. Among other donors, one may be forgiven for singling out a few—Mr. Richard W. Foster, Mr. Samuel Moyerman, Drs. Samuel X Radbill, Fred B. Rogers, and Walter B. Shelley, and Miss Harriet Sartain—as being responsible for the acquisition of either large collections of documentary materials, or numerous unrelated items of specific historical value.

That alertness in the cataloguing of rariora should be preceded by alertness in the selection of them for purchase may also be demonstrated from experience. An English catalogue, for instance, contained the following entry: "TREATISE OF CHIRURGERY. Published with many Excellent Experiments and Secrets. Found out by the Same Author. Title, Contents (2 ll.) and 53 ll., sm. 4to, *unbound*, *London*, *Printed by G. D.*, 1652. Apparently not in Wing." The "Found out by the Same Author", and the unbound state, naturally suggested leaves extracted from a larger publication. This was found to be the case, the larger publication turning out to be the "Three Exact Pieces" by Leonardo Fioravanti, printed in London by George Dawson in 1652, with separate title-pages for the main pieces (Wing 953; Sudhoff 370 (Paracelsus)). The identity was fully established by means of a copy of the complete work which has been in the library since 1856, when our Fellow Dr. Thomas F. Betton donated his personal library, consisting of 1,265 volumes, "including some rare and important volumes".

Exhibits. Two of the main exhibits were based on published works: 1) W. C. Gibson's "Young Endeavour", demonstrating "contributions to science by medical students of the past four centuries"; 2) Garrison and Mor-

ton's "Medical Bibliography: An annotated check-list of texts illustrating the history of medicine", which was drawn on for a demonstration of important contributions by earlier Fellows of the College. A colorful, educational, and much appreciated exhibit in the field of pediatric philately was contributed by two of the philatelist Fellows of the College, Dr. Henry A. Arkless, and Dr. Irving J. Wolman, with the collaboration of Mr. James Wolman, son of the latter. The Section on Medical History was provided with pertinent exhibits, as usual, and, also as usual, other short-term exhibits were provided for occasional meetings.

Fugitive Leaves. Eight numbers of the *Leaves* were issued, as against seven in the preceding year; this was partly due to the fact that five of the issues (Nos. 59–63) required less than the usual time for preparation, being based on a single theme—the "Papers of Charles E. de M. Sajous bearing on the second decade of the Temple University School of Medicine". Nos. 57 and 58 were given over to "Prince Louis Lucien Bonaparte's claim to priority over S. Weir Mitchell in the discovery and isolation of the active principle of snake-venom". No. 64 commenced publication of "Letters of John James Audubon . . . to Richard Harlan . . .and John K. Townsend . . . of Philadelphia; letters of John Bachman . . . to Harlan". All three subjects, to judge from voiced and written comments, found responsive audiences.

Staff. Another forward step in Historical's progress was taken in January, 1963, when the library was authorized to maintain on its staff a half-time typist assigned specifically to the historical cataloguer. The post was filled, during the period covered by this report, by Mrs. Linda Margulies, who had been serving for some time, with distinction, in a similar capacity under the American Philosophical Society Grant. The Grant then still permitted us to obtain some additional assistance from Mrs. Margulies' predecessor, Miss Hildegard Gutzmann.

Miss Wright attended the historical sessions of the International Congress on Medical Librarianship in Washington, in June. The Curator, a member of the Council, attended the annual meeting of the American Association for the History of Medicine in Boston, in May.

W. B. McD., 2d.

Medical Documentation Service

Each day, working with a certain inexorable and tidal quality, the Post Office delivers about a hundred journals to the Library. After their arrival and other matters are recorded they are promptly brought to the Medical Documentation Service where the table of contents of each is studied for articles of interest to our "Scanning service subscribers". Certain titles excite sufficient interest to warrant the examination of the article itself. (For four years we have scanned for articles on "influenza" and naturally we look more closely at articles dealing with *anti-viral* agents.) Letters to the editor and material often not listed in the table of contents are carefully studied for it is in those that unusual side effects of certain agents are frequently first reported. Certain of our subscribers have an arrangement whereby *all* articles on their subjects are immediately photocopied so that they receive within twenty-four hours a full copy of, say, a report of an unusual side effect. This complete report is, perhaps, of more value to them than a cryptic telegraph message. Other subscribers receive their references on typed cards at weekly intervals. If the journals referred to are not in their collection, and the Library receives more than 2,700 journals, most in the field of clinical medicine, they order photocopies. Thus our scanning subscribers receive a custom-tailored service specifically designed for their needs. During the year under review the number of references reported totalled *6329* (*8416*) and the number of subjects averaged *23* (*23*) (Figures for 1962 are given in parentheses throughout this report.) Perhaps because of new governmental regulations the number of pharmaceutical products listed as subjects increased from six to thirteen during the year. Two Fellows of the College are subscribers and several national organizations concerned with specific diseases.

When references are received by some of

our scanning service subscribers they in turn request us to abstract certain articles. With others we have an agreement whereby every article is abstracted. Thus last year we prepared abstracts for Volume 4 of *An Annotated Bibliography of Influenza*, and for Volume 2 of *Cystic Fibrosis*. Certain pharmaceutical companies regularly requisition abstracts. Our primary purpose is to serve Fellows of the College and private practitioners, but we could not keep our staff employed with work for these groups. We are, however, able to provide abstracting service of high quality because of the experience we have with other groups. Thus we are often asked by a physician to prepare a bibliography and abstract all the articles found. The material becomes the skeletal basis for a scientific paper.

During the year we prepared *486* (*1048*) foreign and *821* (*952*) English abstracts.

As just mentioned we prepare bibliographies—some *221* (*216*) in the year just passed. This service is performed for a wide range of specialists in medicine and frequently for the legal profession. ("I wish I'd known five years ago that you did this. A lot of time I'd saved.") Most of the searches are limited in scope and extent. One comprehensive bibliography completed in 1963 was on cystic fibrosis. In this instance, again, because we are an integral part of a major medical library, we were able to provide precisely additional information desired by the client—in this instance the addresses of authors.

Some of the articles we are asked to translate are not yet published or are advance reprints supplied by the authors. Others may date back a hundred years or more. Our translators prepared *140* (*316*) during the year. The languages, as always, ranged from German, Russian, Serbo-Croatian, and French to Japanese. We now offer a very rapid service for the translation of confidential material, usually memos or intra-company letters.

Our other activities are so individualized that they defy classification or description except in individual terms. We edit, we check and retype bibliographies, we verify references by telephone, we suggest a journal for publication of an article twice-rejected. Much of this work is done gratis but our records show that we were paid *$1,068*. (*$419*.) for services called "Miscellaneous" last year.

This work is done, for the most part, by three persons: our staff translator, Paul Walter: our executive secretary, Mrs. Jean Stevens; and the Director. We spent only about *$3,500* (*$6,300*) for outside abstracting and translating. Our part-time assistance was also reduced (*$3,300* in 1963, *$7,400* in 1962). It is doubtful if such a quantity and quality of work is produced elsewhere with the same man hours.

During the year it became apparent that our rate structure, unaltered for more than five years, had not provided for increased costs. Despite the most stringent economies we ended the year with an excess of outgo over income. Our rates have since been increased and we look forward to a better year in 1963–64. It might be added that we should have, to cover overhead, an excess of income over outgo of 15–20% of our gross. Whether our new rates can produce this remains to be seen.

W. L. B.

STATISTICAL SUMMARY

INVENTORY

	1963		*1962*	
Accessioned items[1]				
Incunabula[2]	420		420	
Manuscripts and typescripts	1,285		1,219	
General collection	216,470		211,986	
Phamphlets	5,481		5,004	
		223,656[3]		218,629[3]

Unaccessioned items[1]

Reports	28,805	28,802	
Theses	61,121	60,690	
Pamphlets and reprints	231,540	231,531	
	321,466		321,023

Portraits[4]

Accessioned acquisitions:

1963: 5,027 volumes (2,263 by purchase; 2,358 by gift; 406 by exchange).
(Books, 1782; Periodicals, 2,768; Pamphlets, 477).

1962: 5,130 volumes (2, 389 by purchase; 2,193 by gift; 548 by exchange).
(Books, 1,548; Periodicals, 3,277; Pamphlets, 305).

Non-accessioned acquisitions:[5]

1963: 467 items (Reports, 3; Theses, 431; Miscellaneous, 33).

1962: 282 items (Reports, 3; Theses, 279; Miscellaneous, none).

Currently Received Serials

	Subscription	*Gift*	*Exchange*	*Total*
U. S. A.	391	392	64	847
Western European Continent	704	71	130	905
Eastern European Continent	109	42	37	188
United Kingdom and Eire	125	29	29	183
Asia (including Japan)	40	72	68	180
Latin America and West Indies	30	79	68	177
International	47	6		53
Canada	12	17	6	35
Pacific (including Australasia)	5	15	12	32
Africa	3	9	19	31
United Nations	10	1		11
Grand total 1963	1,476	733	433	2,642
Grand total 1962	1,392	759	408	2,559

New titles: A total of 181 new serial titles was added in 1962/63.

Separate issues received, checked in the Kardex record and shelved totaled 21,601. In addition, thousands of duplicate issues were received as usual. No attempt was made to count those held for exchange or other uses.

Readers' Use of the Library

Library hours. The Library was open, during the academic year, from 9:00 to 9:30 on Mondays and Wednesdays, from 9:00 to 5:00 on other weekdays. During June, July, August, and until the first Monday after Labor Day, the Library was open from 1:00 to 9:00 on Tuesdays; from 9:00 to 5 00 on other weekdays, except Saturdays, when it

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[1] Accessioned items in this library comprise the total number of bound volumes and such unbound pamphlets as have been cataloged as separate bibliographical units regardless of their size.

There remain many thousands of unaccessioned pamphlets awaiting accessioning and cataloging. A true quantitative and qualitative picture of the library's holdings cannot be presented until this wealth of neglected material has been processed and duly registered in our 'accessioned' or 'volume', count.

[2] The Library owns 422 incunabula, but there are two cases of two bound together, reducing the number of accessioned items.

[3] Included in this figure are the following collections which are on permanent deposit in the Library: Gross Library, 3,976 accessioned items; Parry Library of the Obstetrical Society of Philadelphia, 217; Mütter Museum, 200 (Mütter Museum books may not be removed from the College building).

[4] In 1961, 104,639 items were recorded. This included 124 oil, and 268 other, framed portraits in the care of the Committee on College Collections. The count of portraits represented the total number of entries on the cards in the Portrait Catalog. The entries represent, in turn, both loose portraits and those in books, many of them, of course, being merely different reproductions of a single original. Since 1961, accurate figures of additions to this catalog have not been kept and the statistical entry will not appear in future reports.

[5] As usual, not all the pamphlets, theses, and numbers of various journals listed as received have been checked for keeping or discard at the close of the library year.

was closed. The following legal holidays were observed: Thanksgiving, Christmas, New Year's, Memorial, Independence, and Labor Days.

Vistors:

	Reading Room	*Periodicals Room*	*Total*
1963	19,468	3,999	23,467
1962	16,690	3,341	20,031

Circulation:

	Intra-mural[6]	*Extra-mural*[7]	*Books*	*Journals*	*Totals*
1963	33,458	28,104	10,900	43,899	54,799
1962	32,672[8]	18,565	10,235[8]	41,002[8]	51,237[8]

Interlibrary loans: The Library sent 13,381 (1962: 15,176) volumes on interlibrary loan to 288 (1962: 257) libraries in 33 (1962: 31) states, Washington, D. C., and Canada, and borrowed 25 (1962: 22) volumes from 4 (1962: 2) libraries.

Photoduplications: 95,229 pages were photocopied on request (1962: 82,545).

Donations

The donors of library material for the past year number 101 (1962: 91). The Library is indebted for large gifts of books, pamphlets, and unbound periodicals to the following donors: American College of Physicians, Dr. S. Bellet, Biological Abstracts, Children's Hospital, Dr. G. G. Duncan, Hahnemann Medical College, Jefferson Medical College, Dr. R. A. Kern, Lea & Febiger, Lee Ramsdell, Dr. G. M. Miller, National Foundation, Penn Mutual Life Insurance Co., W. B. Saunders Co., Dr. G. A. Schwarz, Dr. T. G. Schnabel; Smith Kline & French Laboratories, Temple University School of Medicine, Wallace Laboratories, Dr. I. J. Wolman.

Various publishing houses, among the large group of corporate donors, have presented new volumes as follows: F. A. Davis Company, 57; Lea & Febiger, 11; J. B. Lippincott Co., 58; W. B. Saunders Co., 84.

Other individual donors were as follows: Drs. P. Aptekman, R. Asnis, O. Batson, Mrs. F. Biddle, Drs. F. P. Brooks, T. Butterworth, B. Chance, D. L. Cowen, O. S. English, J. T. Freeman, J. E. German, F. H. Harvie, B. L. Hunt, H. Ingleby, R. H. Ivy, M. L. Kauffman; Mr. S. Kessler, Mrs. J. V. Klauder, Drs. J. H. Kolmer, E. B. Krumbhaar, W. G. Leaman, Jr., Dr. and Mrs. R. L. Lee; Major J. F. Leys: W. B. McDaniel, 2d, Drs. T. G. Miller, T. F. Nealon, E. J. Neren, G. W. Norris, Y. Okahara, N. Padis, H. Pleasants, S. X Radbill, S. P. Reimann, F. B. Rogers, H. C. Saltzstein, M. Sano, W. B. Shelley, Miss S. A. G. Smith through W. L. Bethel, bequest of W. D. Stroud, Dr. J. M. Thorington, Mrs. R. B. Twining, Dr. M. H. Wendkos, Mrs. F. Western, Dr. F. C. Wood.

Theses and dissertations to the number of 424 have been received on exchange from the following schools of medicine: Basel, Bern, Copenhagen, Erlangen, Geneva, Lausanne, Leiden, Liège, Louvain, Lund, and Uppsala.

The Staff[9]

Librarian
Elliott H. Morse

Assistant Librarian
Mary Elizabeth Feeney

Cataloger
Muriel Zeldis

Serials Librarian
Mrs. Marion I. Schmieder

Reference/Circulation Librarian
Nancy E. Whitten

Assistant Cataloger
Mrs. Kathryn E. Miragliotta

Assistant Serials Librarian
Dorothy Minton

Readers' Service Assistant
Ann D. Vosburgh
Mrs. Kathryn Bernice Odom

Cataloging Assistant
Edward Romasko, Jr.

Serials Assistant
Mrs. Catherine Ledwell

Library Secretary
Mildred C. Gray

Historical Collections
W. B. McDaniel, 2d, PH.D., *Curator*
Edith A. Wright, PH.D., *Rare Book Cataloger*
Mrs. Charna Axelrod, *Typist*

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[6] The number of volumes "consulted in the library" includes only those supplied on demand. Readers have access to the bound volumes of periodicals and reference works kept on the shelves in the Reading Room; the Fellows, and occasionally others, by special permission, have access to the book-stacks. There are, therefore, many volumes consulted of which no accurate record can be kept.

[7] This figure includes 6,763 unbound current issues circulated from the Periodicals Room.

[8] These are corrected figures which are different from those erroneously given in last year's report.

[9] Library staff list as of February 1, 1964.

Medical Documentation Service
Walter L. Bethel, PH.D., *Director*
Mrs. Jean C. Stevens, *Executive Secretary*
Paul Walter, *Bibliographer*

Pages
William Blair
Margaret Graves
Donald E. Inyang
Geza Szarka
Joseph Thompson
Jerome Zatzman

Approved:
John Franklin Huber, M.D.
Chairman, Library Committee

BIBLIOGRAPHY

1. BLOOMQUIST, HAROLD: *The Status and Needs of Medical School Libraries in the United States; a Report Prepared for the National Library of Medicine.* Boston, 1962.
2. *Statement for Consideration at a Meeting of Other Regional Representatives to be held in Boston* (endorsed by Philadelphia Medical School Librarians 2/12/63), typescript.
3. ESTERQUEST, RALPH: *Proposals for Strengthening Medical Resources in New York State.* Albany, New York State Library, 1962.
4. TERRY, LUTHER L: *Address of Welcome. Bull. Med. Lib. Assn.* **52:** 65–66, Jan. 1964.
5. KEENAN, ELIZABETH L: *Interlibrary Loan, 1952–62: Ten Years of Progress? Ibid.* **52:** 313, Jan. 1964.
6. ADAMS, SCOTT: *MEDLARS and the Library Community. Ibid.* **52:** 176–7, Jan. 1964.

Annual Report of the Committee on the Mütter Museum and College Collections

THE Mütter Museum of the College of Physicians is open daily with the exception of Saturdays and Sundays, from 9 A.M. to 1 P.M. and from 2 P.M. to 4 P.M.

The visitors for the year numbered 2165, the increase largely due to the groups from the various medical colleges, namely; the University of Pennsylvania, Hahnemann Medical College, Woman's Medical College and Temple University. There were also groups from the Biology Classes of Radnor and Clifton Heights High Schools. Every day some students visit the museum from the Franklin School of Science and Arts, as this visit is assigned to them by the school. Individuals from many states and foreign countries also toured the museum during the year.

The 75th Thomas Dent Mütter Lecture was delivered by Arthur Purdy Stout, M.D., Emeritus Professor of Surgery, College of Physicians & Surgeons, Columbia University, New York City, on March 6, 1963. His subject was *Mesenchymal Tumors of Soft Tissues*.

Because the two old typewriters in the museum could no longer be repaired, a new Standard Electric Typewriter was purchased and new labels for all specimens are being made on it. The six museum chairs were reupholstered and repaired.

Gifts received during the year, while exhibited in the museum, were catalogued under College Collections.

Mrs. Ella N. Wade was reappointed curator for the year 1963-1964.

College Collections

The four sculptured studies in bronze of the progress of fatigue in athletes, made and presented by Dr. R. Tait McKenzie, were loaned for one year to the Wyeth Laboratories for exhibit at major medical meetings.

A bronzed plaster bust of Hippocrates, that was kept in the store-room, was loaned to the late Dr. Leandro M. Tocantins, for his office. It will be returned in about two years.

The College received an oil portrait of Dr. Lewis Cass Scheffey, painted by John C. Johansen, and this was hung on the north wall of Mitchell Hall. A new plate for the portrait of Dr. T. Grier Miller was purchased, and the portrait moved from the College office to Mitchell Hall with the portraits of other former Presidents of the College.

The full-length portrait of Dr. William Thomson, by Thomas Eakins, was cleaned and varnished by Mr. Cesare A. Ricciardi, since Mr. Frank Ireland, who usually restores the College portraits, has been unable to work because of illness.

Three large prints of the portrait of Dr. W. L. Atlee were sent to Mr. Jordon H. Nemet of East Brunswick, New Jersey, upon request.

Some gifts were offered to the College during the year that could not be accepted because of duplication and lack of exhibition space.

The Committee accepted a spinal manometer and a Koster's blood transfusion set from *Dr. Fred B. Rogers*, and a china plate depicting a physician holding a pomander cane from *Dr. Samuel X Radbill. Dr. J. Monroe Thorington*, a generous donor, presented for College Collections a Baroque pharmacy jar of wood from Innsbruck, Austria, date about 1750.

Mrs. Ella N. Wade was reappointed clerk-technician for the year 1963–1964.

A. Reynolds Crane, M.D.
Chairman

List of College Lectures, 1963

2 January 1963

Dowling, Harry F. Antibiotics—Singly or in Combination? (Nathan Lewis Hatfield Lecture XLVII; *Transactions & Studies*, July 1963.)

6 February 1963

Woodward, Theodore E. Typhoid Fever: A Discussion of its Pathogenesis, Physiologic Abnormalities and Management. (Mary Scott Newbold Lecture LXXXIV; *Transactions & Studies*, July 1963).

6 March 1963

Stout, Arthur P. Mesenchymal Tumors of the Soft Tissues. (Thomas Dent Mütter Lecture LXXV; *Transactions & Studies*, October 1963).

19 March 1963

Corner, George W. George Hoyt Whipple, Nobel Prize Pathologist. (Kate Hurd Mead Lecture XV; *Transactions & Studies*, July 1963).

3 April 1963

Kern, Richard A. Nutrition Surveys Co-Sponsored by Our Government in Foreign Lands. (Mary Scott Newbold Lecture LXXXV; *Transactions & Studies*, October 1963).

8 May 1963

Joint Meeting of the Philadelphia County Medical Society and the College of Physicians of Philadelphia.

I. Presentation of the 40th Annual Strittmatter Award to Dr. John H. Gibbon, Jr., by Dr. George Willauer.

II. Presentation of citations to physicians who have completed fifty years in the practice of medicine. Certificates awarded by Dr. Malcolm W. Miller, Chairman, Board of Trustees, Pennsylvania State Medical Society.

2 October 1963

Billingham, Rupert E. Transplantation Immunity and the Maternal-Fetal Relationship. (Alvarenga Prize Lecture XXIII; *Transactions & Studies*, January 1964).

6 November 1963

Burger, H. C. Ballistocardiography and Vectorcardiography: Similarity and Difference. (Nathan Lewis Hatfield Lecture IIL; *Transactions & Studies*, April 1964). Joint Meeting of the Philadelphia County Medical Society and the College of Physicians of Philadelphia.

4 December 1963

Shimkin, Michael B. The Numerical Method in Therapeutic Medicine. (James M. Anders Lecture XLIII; *Transactions & Studies*, January 1964).

17 December 1963

Gilbertson, Wesley E. New Challenges in Environmental Health Control. (Arthur Parker Hitchens Lecture X; *Transactions & Studies*, April 1964).

Transactions of the Sections

SECTION ON GENERAL MEDICINE

28 October 1963

THE FAMILY INCIDENCE OF ULCERATIVE COLITIS AND REGIONAL ILEITIS. Henry J. Tumen, M.D. (Guest Lecturer)

PLASMA 17 OH CORTICOSTEROIDS AND GASTRIC ACIDITY FOLLOWING INSULIN INDUCED HYPOGLYCEMIA. Jaime Krawiec, M.D.,* Jane Straughn, M.D.,* and Edwin O. Polish, M.D. (Discusser: Rodman B. Finkbiner, M.D.) (*Abstract 1*, below)

SORBITOL DEHYDROGENASE IN THE DIAGNOSIS OF LIVER DISEASE. Irving Wiesner, M.D.*, Howard M. Rawnsley, M.D.*, John R. Senior, M.D.*, and Frank P. Brooks, M.D. (Discusser: H. Phelps Potter, M.D.) (*Abstract 2*, below)

SUBCLINICAL HEPATITIS FOLLOWING BLOOD TRANSFUSION. David D. Prager, M.D.*, Constantine C. Hampers, M.D.,* and John R. Senior, M.D.* (Discusser: Franz Goldstein, M.D.) (*Abstract 3*, below)

27 January 1964

POST-OPERATIVE MYOCARDIAL INFARCTION. Samuel Baer, M.D., Fred Nakhjavan, M.D.,* and Mehdi Kajani, M.D.* (Discusser: Daniel W. Lewis, M.D.*) (*Abstract 4*, below)

LACTATE-PYRUVATE STUDIES IN ISCHEMIC FEET. Sandor A. Friedman, M.D.,* and Raymond Penneys, M.D. (Discusser: Norman Learner, M.D.) (*Abstract 5*, below)

PRESENT-DAY USE OF THE OSCILLOMETER IN PERIPHERAL ARTERIAL DISEASE. Meyer Naide, M.D. (Discusser: Marvin L. Sachs, M.D.*) (*Abstract 6*, below)

PRIMARY HYPERTENSION: SURVEY OF THE SURVIVAL OF PATIENTS AFTER TEN YEARS OF MEDICAL AND SURGICAL TREATMENTS. Joseph H. Hafkenschiel, Jr., M.D., John D. Bentley, A.B.,* Jerry E. Schmitthenner, M.D.,* and Earl A. Daugherty, M.D.* (Discusser: Alfred M. Sellers, M.D.) (*Abstract 7*, below)

* By invitation.

SECTION ON MEDICAL HISTORY

8 October 1963

WALT WHITMAN'S PHYSICIANS IN CAMDEN. Harold D. Barnshaw, M.D. (*Transactions & Studies*, January 1964)

DARWIN'S PROLEGOMENA TO PSYCHOSOMATIC MEDICINE. Nicholas Padis, M.D.

REFLECTIONS ON THE MEANING OF ILLNESS BY BISHOP JEREMY TAYLOR (1613–1667) OF ENGLAND. Rev. Charles R. Jaekle,* Professor of Pastoral Care, Episcopal Theological Seminary, Austin, Texas.

14 January 1964

HEREDITARY DISEASE—A VIEW FROM THE SIXTEENTH CENTURY. David F. Musto, M.D.*

AMERICAN SCIENCE AND THE BEGINNINGS OF VITAMIN RESEARCH. Charles E. Rosenberg, PH.D.*

A SURVEY OF PENNSYLVANIA HOSPITAL ADMISSIONS, 1751–1850. Robert W. DOWNIE, A.B.*

SECTION ON OPHTHALMOLOGY[1]

21 March 1963

THE OCULAR FINDINGS IN A PATIENT WITH THE TRISOMY 13–15 SYNDROME. Myron Yanoff, M.D.,* Harold G. Scheie, M.D., and William C. Frayer, M.D.

MEDICO PROGRAM IN ALGERIA. Robison D. Harley, M.D.*

OCULAR MANIFESTATIONS OF MONILIASIS. William Bonatti, M.D.,* Edward A. Jaeger, M.D.,* and William C. Frayer, M.D.

18 April 1963

QUICK START TOWARD THE RIGHT GOAL FOR NEWLY BLIND ADULTS. Mrs. Jane McShane*

MACULAR DEGENERATION SECONDARY TO

[1] Abstracts of the presentations at this Section customarily appear in the *American Journal of Ophthalmology* and *A.M.A. Archives of Ophthalmology*.

PHENOTHIAZINE. Milton C. Connell, M.D.,* Joseph R. McFarlane, M.D.,* and Brooks J. Poley, M.D.*

FIBROSIS OF THE INFERIOR RECTUS: A CASE REPORT OF SURGICAL MANAGEMENT. Thomas R. Hedges, Jr., M.D., and Robert King, M.D.*

17 October 1963

JUVENILE CATARACT WITH PERSISTENT HYALOID ARTERY AND HEMORRHAGE. Turgut N. Hamdi, M.D. (Discusser: Fikret B. Mutlu, M.D.*)

RADIOLOGICAL ASPECTS OF FRACTURED ORBITS. Philip G. Spaeth, M.D., and Robert H. Roy, M.D.*

THE STRUCTURE OF FETAL HYALOID SYSTEM AND TUNICA VASCULOSA LENTIS. Fikret B. Mutlu, M.D.,* and Irving H. Leopold, M.D.

21 November 1963

THE EYE AND THE ENDOCRINES. Edward Rose, M.D. (Twenty-Sixth Annual de Schweinitz Lecture.)

19 December 1963

PERIMETRIC AND VISUAL ACUITY CHANGES DURING OPHTHALMODYNAMOMETRY. Edward A. Jaeger, M.D.,* S. D. Weeks, M.D.,* and Thomas D. Duane, M.D.

DISPLACEMENT OF IMPLANTS IN SCLERAL PLASTIC PROCEDURES: A COMPLICATION OF SCLERAL BUCKLING. Lov K. Sarin, M.D.*

IODINE 125 IN DIAGNOSIS OF OCULAR MELANOMA. Edwin U. Keates, M.D.,* and I. David Charkes, M.D.*

16 January 1964

PHILIP SYNG PHYSICK AND THE BEGINNING OF AMERICAN OPHTHALMOLOGY. Daniel Albert, M.D.*

VISUALIZATION OF NERVE FIBER LAYER PATHWAYS WITH POLARIZED LIGHT. Alan Laties, M.D.*

MODERN ADVANCES IN PLASTIC EYE SURGERY. Gerard M. Shannon, M.D.

13 February 1964

A CLOSER LOOK AT EPINEPHRINE. Peter C. Kronfeld, M.D.,* Professor of Ophthalmology, University of Illinois College of Medicine, Chicago, Illinois.

SECTION ON OTOLARYNGOLOGY[2]

20 November 1963

CHOLESTEATOMA OF THE PARANASAL SINUSES. Max Lee Ronis, M.D.*

WHY DO PEOPLE CHOKE ON FOREIGN OBJECTS? William A. Lell, M.D.

PRESENT STATUS OF THE MICROSURGERY OF OTOSCLEROSIS. TECHNIQUE EVALUATION OF VARIOUS PROCEDURES USED IN STAPES SURGERY FOR OTOSCLEROSIS. David Myers, M.D.

9 January 1964

AN EVENING ON THE EAR. Howard P. House, M.D.* (Second George M. Coates Memorial Lecture of The Philadelphia Laryngological Society. Joint meeting with the Section on Otolaryngology, The College of Physicians of Philadelphia, and The Triological Society.)

SECTION ON PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

25 June 1963

PANEL DISCUSSION: MEDICAL CARE FOR THE AGED. B. Russell Franklin, M.P.H., Philadelphia Department of Health; Thomas F. Manley, President, Associated Hospital Service of Philadelphia (Blue Cross Plan); W. Benson Harer, M.D., President, Pennsylvania State Medical Society; John Colao, Director of Organization, National Council of Senior Citizens, Inc., Washington, D. C. (Joint Meeting with Pennsylvania Public Health Association, Region One.)

[2] Abstracts of the presentations at this Section customarily appear in the *A.M.A. Archives of Otolaryngology.*

ABSTRACTS

Abstract 1

PLASMA 17 OH CORTICOSTEROIDS AND GASTRIC ACIDITY FOLLOWING INSULIN INDUCED HYPOGLYCEMIA. Jaime Krawiec, M.D., Jane Straughn, M.D., and Edwin O. Polish, M.D., with the assistance of M. Molinces. Department of Medicine, Hahnemann Medical College and Hospital, Philadelphia, Pa.

The purpose of the study was to relate circulating adrenal steroids to the acid secretion which follows insulin hypoglycemia. The study indicated that gastric secretion following insulin hypoglycemia was variable. The responses included a single peak which declined in two hours, occasionally more than one response during the first two hours, and single to multiple responses in the second two hours following stimulation. The pattern of response was not related to circulating 17 OH corticosteroid levels, fasting gastric acidity or the depth of hypoglycemia. No relationship was demonstrated between the presence of duodenal ulcer disease and the presence of a "late phase" of gastric secretion.

Abstract 2

SORBITOL DEHYDROGENASE IN THE DIAGNOSIS OF LIVER DISEASE. Irving Wiesner, M. D., Howard M. Rawnsley, M.D., John R. Senior, M.D., and Frank P. Brooks, M.D. Department of Medicine, Hospital of the University of Pennsylvania, Philadelphia, Pa.

In an attempt to find a more useful clinical test for the diagnosis of liver disease, serum levels of the enzyme sorbitol dehydrogenase were measured in 64 patients with liver disease and 100 patients with non-hepatic diseases. The majority of patients in both groups had concomitantly elevated serum levels of SGOT and SGPT (serum glutamic-oxaloacetic and glutamic-pyruvic transaminases).

Serum sorbitol dehydrogenase determinations have been reported to be useful in the diagnosis of liver disease primarily because of the high concentration of this enzyme in the liver compared with low concentrations in other organs of the body. A simple spectrophotometric test was used to determine the enzyme activity.

In the patients tested, SDH elevations were found to be more specific for liver involvement but much less sensitive than the transaminases. The serum sorbitol dehydrogenase assay, in its present form, does not appear to offer any special advantages over the transaminase studies presently employed to detect hepato-cellular disease, but may be of value in the occasional patient with elevated serum transaminases in whom the clinical evidence for liver disease is equivocal.

Abstract 3

SUBCLINICAL HEPATITIS FOLLOWING BLOOD TRANSFUSION. David D. Praeger, M.D., Constantine L. Hampers, M.D., and John R. Senior, M.D. Medical Services, Philadelphia General Hospital.

As has been found with other viral diseases, we have suspected that post-transfusional hepatitis may occur in subclinical form considerably more often than the number of obvious icteric cases would indicate. In the hope of detecting hepatitis in this subtler guise, a prospective study using several enzyme assays was set up to follow patients at one, two and four week intervals for six months after blood transfusion of one or more units on a single day. Approximately sixty patients from the obstetrics and gynecology service were observed in this pilot study, after pre-existing liver disease was excluded insofar possible by careful questioning, examination, and laboratory tests. Following transfusion, we urged the patients to return at intervals to the clinic for serial reexamination and contribution of blood samples for estimation of serum activities of glutamic-oxalacetic and glutamic-pyruvic transaminase, and isocitric dehydrogenase.[3] When significant enzyme

[3] The authors are grateful to Dr. Robert F. Norris of the Pepper Laboratories of the Hospital of the University of Pennsylvania for his advice and assistance in carrying out these determinations.

activity elevations occurred, we advised hospitalization for more complete liver studies and liver biopsy.

Some of the goals of the study were to learn more about the incidence of post-transfusional hepatitis in such a population, the ratio of subclinical to icteric hepatitis, the incidence of infectious hepatitis transmitted by the parenteral route, the usefulness of several enzyme activities as parameters of active hepatic disease and an idea of which might be most sensitive or reliable, clinical and histologic changes early in the course and during the evolution of the disease, possible means of identifying asymptomatic carriers in the donor population, the relationship of acute hepatitis to chronic hepatitis and post-necrotic cirrhosis in long-term studies, and to obtain blood and liver specimens early in the course of the disease for more attempts at possible isolation of a virus causing the hepatitis.

As of approximately halfway through the study, 61 out of 117 transfused patients contacted had continued to cooperate and were observed closely. Of the 61, more than 15 per cent showed elevations of all the serum enzyme activities persisting more than three weeks. Each of the five patients who agreed to percutaneous needle biopsy of the liver showed histologic evidence of hepatitis. Despite this none developed any significant clinical evidence of hepatitis or jaundice, and the diagnosis would have been missed had a less sensitive means of detection been used. The 61 patients received a total of 70 units of blood, representing an incidence of approximately 13 cases of hepatitis per 100 units transfused, although at the time of this report not all patients had been followed a full six months. One patient showed initial enzyme elevations only four weeks after transfusion, consistent with the known incubation period of infectious hepatitis, while the remainder first showed elevations at later times expected for serum hepatitis. Although the enzyme activities varied roughly in parallel, the isocitric dehydrogenase seemed slightly more sensitive generally than the transaminases. We were unable to define any characteristics of the donors by history, examination, or by liver function tests which would identify them as carriers. Further efforts are being made to induce to come for examination the other donors whose blood was given to patients who developed hepatitis. Attempts to isolate or grow virus in tissue culture from serum or from tissue obtained at liver biopsy have been unsuccessful to date. It is of interest that two patients showed spontaneous secondary rises of enzyme activities some months after their initial elevations; these patients are being followed beyond six months for possible evidence of persisting, subacute hepatitis.

Although it is too early to draw strong conclusions, it appears that the incidence of anicteric serum hepatitis is many fold greater than evidence of obvious jaundice indicates it to be. It seems reasonable that this mild form of hepatitis should be considered important as a hazard to the patients who may develop eventual chronic hepatitis as well as to recipients of blood donated by them.

Abstract 4

POST-OPERATIVE MYOCARDIAL INFARCTION. Samuel Baer, M.D., Fred Nakhjavan, M.D., and Mehdi Kajani, M.D. Department of Medicine, Albert Einstein Medical Center, Philadelphia, Pa.

For a number of years, we have been interested in silent or unsuspected myocardial infarction. We have been particularly impressed with the number of these myocardial infarctions that occurred during or after surgery. A more detailed analysis of these cases was undertaken, hoping it would improve our early recognition of post-operative myocardial infarction.

PLAN OF STUDY

One hundred and fifty cases coming to surgery were selected in a random fashion, from January 1, 1962 to July 1, 1963. The cardiac and pulmonary background of these patients were reviewed in detail. Routine pre-operative studies included blood count, blood urea,

AGE INCIDENCE IN CASES OF POST-OPERATIVE INFARCTION

	30-39	40-49	50-59	60-69	70-79	80-89	TOTAL
MALE	1	2	4	8	2	0	17
FEMALE	0	2	5	7	9	1	24

BACKGROUND IN 41 CASES OF POST-OPERATIVE INFARCTION

PREVIOUS INFARCTION	10
ANGINA	13
HYPERTENSION	22
DIABETES	5
NONE OF AOVE FINDINGS	12

FINDINGS IN 41 CASES OF POST-OPERATIVE INFARCTION

CHEST PAIN	14
DYSPNEA	2
SWEATING	1
HYPOTENSION	8
DIZZINESS	1
WEAKNESS	1
SUDDEN DEATH	3
NO SYMPTOMS	16

blood sugar, urinalysis and an electrocardiogram. After surgery, indicated laboratory tests (including serum enzymes) were done. All tracings were interpreted by one of us and repeated as indicated. Added to the 17 cases we had seen prior to 1962 were 24 cases obtained during this study, making a total of 41 cases of post-operative myocardial infarction.

The Clinical Picture

A number of features in these cases of acute post-operative infarction differ from those usually described in acute myocardial infarction. Table 1 indicates the age and sex incidence. Fifty-nine per cent occurred in women, an incidence quite different from the well accepted ratio, (1) of approximately 3 males to 1 female. This may be due to the greater number of women being admitted to the hospital for surgery. The age incidence is also a bit different than that usually found in acute myocardial infarction. Apparently, post-operative infarction occurs almost a decade later in both sexes.

In Table 2 are listed some of the symptoms and findings, significant or suggestive of acute myocardial infarction, that occurred after surgery. The most frequent disturbances were chest pain and a fall in blood pressure. Fourteen cases had chest pain and 8 post-operative hypotension. Warranting considerable emphasis however, is the fact that 39% (16 cases) had no post-operative symptoms at all. The diagnosis in these cases was made by routine serial electrocardiograms. Seventy per cent of our 41 cases had previous angina pectoris or hypertension or myocardial infarction (Table 3).

The cases were also divided into groups, according to the pre-operative electrocardiograms. Forty-four of the 150 cases had normal tracings prior to surgery; 7 of these cases developed post-operative infarction. Of the remaining 106 cases with abnormal tracings, 90 had non-specific abnormalities and 16 definite

ECG evidence of previous or recent infarction. In the group of 41 cases of post-operative infarction, 82% had abnormal pre-operative tracings. In addition to the 41 cases, there were 9 patients that developed electrocardiographic abnormalities sufficient to be called "ischemic", but not severe enough to be labeled as post-operative infarction. Seven of these 9 cases (77%) also had abnormal pre-operative tracings. It would appear therefore, that an abnormal cardiogram prior to surgery merits special attention and should stimulate us to do serial post-operative electrocardiograms.

The mortality in these 41 cases was surprisingly low. Some authors have reported death rates in post-operative infarctions as high as 60%. In this group only 3 cases died, a mortality of 7%. The diagnosis was confirmed in each case at autopsy.

Case Presentations

We have selected for illustration 4 of these 41 cases:

Case 1

E. B., a 71 year old woman, was admitted on 8/10/59 for removal of an abdominal tumor found on routine physical examination. Examination revealed a normal temperature, a pulse of 70 and a blood pressure of 160/80. She was slightly obese. The chest was clear and the cardiac examination completely normal. A large abdominal mass was found; the pre-operative diagnosis was ovarian cyst. Routine laboratory findings were within normal limits. A cardiogram done on 8/13/63, revealed some non-specific flattening of T_{4-6}.

On 8/13/63, a laparotomy was done and a large ovarian cyst was removed. Two days after surgery, she vomited her dinner and became "cold and clammy". The pulse was 100 at this time, the blood pressure 150/80. There was some slight dyspnea, but no chest pain. A few premature ventricular contractions were noted. For three days, there was some post-operative ileus. An electrocardiogram taken on 8/19/63, six days after surgery, revealed an extensive anterior wall infarction. She experienced no further difficulty, made a smooth convalescence and was discharged on 9/17/63.

Comment: This patient had been mildly hypertensive, but had no previous cardiac history. The cardiogram before surgery revealed some non-specific abnormality. The only symptoms suggestive of acute myocardial damage were that she became "cold and clammy". The changes on the subsequent cardiograms were diagnostic of acute damage and persisted for a number of months.

Case 2

Mrs. B. W., aged 56, was admitted on 4/24/59 for a D. & C. and possible hysterectomy. She had had known hypertension for a number of years, but specifically denied chest pain, dyspnea or any of the anginal equivalents. A left salpingo-oophorectomy was done on 4/25/59. A cardiogram ordered prior to surgery was accidentally omitted and a tracing was not taken until 5/1/59. At this time, it revealed deep T wave inversions in leads 1, AV_L, V_2 and V_3. There were no cardiovascular complaints, but it was felt that she had experienced recent antero-septal damage. Three days later, she was discharged, to continue her convalescence at home. Over the next few months, the ECG abnormalities gradually regressed. Both her family physician and the senior author felt that Mrs. W. had recovered from an unsuspected myocardial infarction.

On 9/16/59, she was again hospitalized, this time for repair of an inguinal hernia. Forewarned because of the previous episode, careful cardiovascular evaluation was carried out prior to surgery. There were no complaints suggestive of cardiac or pulmonary disease. The physical examination was essentially negative, other than for a blood pressure of 220/110. The chest x-ray was normal. The cardiogram revealed old antero-septal infarction. On 9/18/59, routine herniorrhaphy was done without any difficulty. The day after surgery, the blood pressure fell to 140 systolic. Though there were no significant complaints, a cardiogram was taken on 9/19/59. There was

now a marked increase in ECG abnormalities. It was apparent that she had again experienced severe myocardial damage, probably in the nature of antero-medial infarction. However, her convalescence continued uneventful and she was discharged for further care at home eight days after surgery. Serial cardiograms were done at weekly intervals. Though she still had no symptoms or physical findings suggestive of organic cardiac involvement, the marked electrocardiographic abnormalities were present four weeks after discharge. Gradually, however, the T waves became isoelectric and then upright.

Comment: This patient apparently experienced two separate and distinct post-operative myocardial infarctions, both without characteristic symptoms.

Case 3

Mr. J. L., a 56 year old man, had had mild angina for five years. In March, 1961, he was admitted for treatment of rectal bleeding; no specific cause for this was demonstrated. In June, 1961, he was hospitalized again for an acute myocardial infarction, from which he made an excellent recovery. He was readmitted on 1/18/62 for recurrent rectal bleeding. On admission, he had no cardiovascular or pulmonary complaints. The pulse was 98 and regular, the blood pressure 170/90. The chest was clear and there was no evidence of congestive failure. The heart was slightly enlarged to the left and a soft mitral systolic murmur was audible. A large rectal mass was felt. The various laboratory tests done were all normal. A cardiogram done on 1/19/62, showed some flattening of the T waves in a number of leads. On 1/12/62, a laparotomy was done. Four days after surgery, he complained of a burning sensation deep in the upper sternal area. This persisted for a few hours and a house officer took an electrocardiogram. By the next morning, this discomfort had disappeared and the patient remained symptom free for the balance of his hospital stay. Serial tracings however, continued to reveal evidence of an extensive anterior wall infarction. He was discharged in excellent condition on March 1, 1962.

Comment: Despite the paucity of symptoms, this man experienced an extensive post-operative myocardial infarction, his second infarction. The previous hypertension, angina pectoris and old infarction merit emphasis.

Case 4

E. P., a 63 year old white female, was admitted on 11/19/62 because of progressive vascular insufficiency of the right leg. There had been a known history of severe hypertension, for which a sympathectomy had been done eight years prior to admission. There was no previous chest pain and only slight exertional dyspnea. The pulse was 72, the blood pressure 130/100. The chest was clear, the heart was slightly enlarged to the left. Heart sounds were of medium intensity and regular; no murmurs were audible. A good femoral pulse was felt on the right, but none on the left. A cardiogram done on 11/20/63 was abnormal. After three weeks of conservative treatment, a left lumbar sympathectomy was done on 12/10/62. The next day tachycardia was noted, but there was no nausea, sweating, chest pain or dyspnea. A cardiogram taken on 12/13/63, revealed increased ECG abnormalities. Serial tracings confirmed the presence of an acute anterior wall infarction. She had an uneventful recovery and was discharged in good condition on January 23, 1963.

Comment: This patient had previous hypertension and extensive vascular disease. The only indication of post-operative cardiac damage, however, was sinus tachycardia the day after surgery. This could easily have been overlooked and attributed to the surgery itself.

Discussion

A study such as this has a number of limitations. Since we could not carry out ECG examinations on all patients coming to surgery during this study, we obviously could not determine the true incidence of post-operative myocardial infarction. However, the ease with

which we accumulated these cases and the number that were uncovered after this study was begun, suggests that post-operative myocardial infarction is a rather common occurrence. Years ago, Master, Dack and Jaffe (2) reviewed the topic; of the 625 cases of myocardial infarction they reported, 5.6% (35) were post-operative. Similar observations were reported by a number of authors (3–8). All of these observers have stated that pain may be absent in 20%–50%, and that as many as 50% of post-operative infarctions are not recognized. It is becoming generally accepted that about 2% of patients submitted to major surgical procedures experience myocardial infarction (9).

Why are so many of these cases "silent"? For one thing, the few symptoms these patients have may be attributed to many things —to the surgical procedure, the post-operative state, the administration of narcotics, a clouded sensorium, etc. Hypotension or hemorrhage may dull the cerebral circulation and the ability of the patient to perceive pain. We have confirmed the findings of previous authors that the post-operative development of hypotension is of great import and may frequently lead to the demonstration of an unsuspected infarction.

In making this diagnosis, we must of course be cognizant of the various diagnostic possibilities that may exist. They include the tachycardia syndrome, ileus, pericarditis, hypokalemia and pulmonary infarction. We would like to emphasize again that the presence of hypertension or angina or a previous infarction, offer fertile soil for the development of this disturbing post-operative complication. We feel that more frequent medical consultation and routine serial electrocardiograms might reveal more of these cases.

Conclusions

1. Forty-one cases of post-operative myocardial infarction are reported.

2. Post-operative infarction is more apt to occur at a later age than the average case of acute myocardial infarction.

3. An evaluation of the medical background revealed 70% of these 41 cases had a history of hypertension, angina pectoris or previous infarction.

4. In 39% of the 41 cases studied, there were no post-operative symptoms suggestive of myocardial infarction.

5. An abnormal cardiogram prior to surgery should make us anticipate the possible development of post-operative infarction. Eighty-two per cent of our 41 cases had abnormal tracings prior to surgery.

6. Routine post-operative cardiograms and more frequent medical consultation should uncover more of these cases.

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Abstract 5

Lactate-Pyruvate Studies in Ischemic Feet. Sandor A. Friedman, M.D., and Ray-

mond Penneys, M.D., Vascular Section, Hospital of the University of Pennsylvania, and Peripheral Vascular Section, Division of Cardiology, Philadelphia General Hospital.

With chronic arterial occlusion, the extremity often remains viable with drastic reduction in blood flow; even when the flow to the toes has been restricted to as little as 2 ml. per 100 ml. of tissue per minute, a foot may show no evidence of gangrene or ulceration. These facts are difficult to explain and one possibility is that the ischemic areas alter their metabolism toward an anaerobic state as a compensation for impaired blood flow.

Carlson and Pernow (1962) have shown that the ratio of lactate concentration to pyruvate concentration in femoral venous blood reaches higher levels during exercise in patients with arteriosclerotic legs than in normal subjects, indicating an increased shift toward anaerobic metabolism.

Since ischemia of the foot is the real threat to the limb's survival and since a shift in the type of metabolism of the foot might be obscured in sampling the femoral vein, we studied feet severely ischemic from chronic arterial occlusion due to arteriosclerosis obliterans, thromboangiitis obliterans and collagen-vascular disease, by obtaining venous blood from the dorsum of the foot. Severe ischemia was manifest by the usual clinical features and quantitated by a vasodilatation test; the blood flow capacity to the toes was less than 10% of normal in the 6 patients studied. Blood was drawn in the dependent position after emptying the veins by elevation. Venous blood from the patients' hands and from the hands and feet of 6 normal, vasodilated subjects was used as controls. The Friedemann-Haugen and Barker-Summerson methods were used for pyruvate and lactate respectively, and Huckabee's precautions were followed.

In the ischemic feet, the lactate-pyruvate ratio averaged 8:1 (6:1 to 11:1), the lactate, 13.7 (8.4 to 19.5) mg.%, and pyruvate, 1.7 (1.3 to 2.d) mg.%. There was no essential difference between these results and the control values. Thus, despite severe deprivation of blood flow, we found no evidence of increased anaerobic metabolism in ischemic feet at rest.

These blood samples represented venous drainage of the skin and superficial tissues of the foot. Since it has been shown with an oxygen electrode that the skin of ischemic feet is very hypoxic and since there is *in vitro* evidence that skin can increase its anaerobic glycolysis in the presence of complete hypoxia, it is highly probable that the skin of our patients' foot was still not hypoxic enough to produce such a change and that the ischemic limb in which this change does occur must be very close to a state of gangrene.

Abstract 6

PRESENT-DAY USE OF THE OSCILLOMETER IN PERIPHERAL ARTERIAL DISEASE. Meyer Naide, M.D., Department of Medicine, Woman's Medical College of Pennsylvania, Philadelphia, Pa.

The use of the oscillometer in peripheral arterial disease has been downgraded in recent years probably because of increasing use of angiography in anticipation of arterial surgery. However, the oscillometer supplies useful information in patients with arterial occlusive disease in the extremities and is much simpler than arteriography. The oscillometer may aid in evaluating the degree of ischemia and thus help in determining whether an aortagram or femoral arteriogram is necessary. The technique of oscillometry was discussed. Certain pointers must be borne in mind in using an oscillometer to avoid erroneous readings. An oscillometer is useful in areas on the extremities where a pulse cannot be felt as, for instance, between the knee and the groin. Also, the oscillometer is much more delicate than the fingers in feeling for pulses. The oscillometer may pick up a pulse which is impossible to pick up in some legs, as with severe edema or in obese legs. Oscillometric readings are also useful in following the course of arterial disease in each individual and also the effect of therapy.

Abstract 7

PRIMARY HYPERTENSION: SURVEY OF THE SURVIVAL OF PATIENTS AFTER TEN YEARS OF MEDICAL AND SURGICAL TREATMENTS.

Joseph H. Hafkenschiel, Jr., M.D., Jerry E. Schmitthenner, M.D., John D. Bentley, A.B., and Earl A. Daugherty, M.D. Cardiac Clinic, Lankenau Hospital, Philadelphia, Pa.

The majority of patients with high blood pressure seen in clinic and office practice have primary hypertension, even though recent advances have reduced the number somewhat. Primary hypertension remains a diagnosis established by excluding the causes of secondary high blood pressure. Hopefully, in the future, this diagnostic grouping may represent a more homogeneous group of patients having in common a disease course of similar natural history.

The introduction of potent depressor drugs since 1950 has made it possible to moderate or normalize blood pressure in patients having severe elevation of diastolic pressure. This success in blood pressure reduction has made medical management the preferred initial therapeutic approach, rather than surgical intervention as was prevalent before 1950.

Do antihypertensive drugs prolong life? To measure this requires some standard of comparison. Smithwick and his co-workers have provided us with the standard up to this time. More of their operated patients have survived when compared with those not operated. These patients had been classified according to the severity of their cardiovascular-renal disease and many have been followed as long as 15 years after the thoraco-lumbar sympathectomy was performed.

Our summary is a progress report on the ten-year survival of a series of 319 patients diagnosed as having primary hypertension. At the time of the initial studies, they were classified by us using the same criteria as described as Smithwick. Some of those with severe hypertension (87) have been operated upon by our surgical colleagues and others (232) have been managed medically because they were only mildly hypertensive or because renal damage was severe enough to cause azotemia.

Using the four severity groupings of Smithwick, our data shows the following percentage survival at ten years: Group 1, 90.4%; Group 2, 73.4%; Group 3, 49.1%; Group 4, 49.6%.

Male survival is not as favorable as that of females. The medically-treated group reveals no survival difference from the surgically-treated group.

Closer inspection suggests that there are two curves: patients in groups 1 and 2 (total 206) comprise one curve and patients in groups 3 and 4 (total 113) the other. No attempt has been made in the latter group to single out those patients who were in the "malignant" stage or the "accelerated phase" of the disease. This is because when first seen, the total number with papilledema was less than 10% of those in groups 3 and 4. The overall survival of the patients in groups 1 and 2 is 82% but only 44% of those patients initially in groups 3 and 4 survive after ten years.

Of the patients in groups 3 and 4, the surgically treated females have the best survival, 62% with a mean age at time of entry of 40.0 years. Medically treated females had a 56% survival with mean age of 51.9 years. The better survival of the females is a real difference since only 38% of the medically managed males survived (mean age, 50.4 years) and only 30% of those surgically treated (mean age, 45.3 years).

The estimates of survival to ten years of males managed medically (38%) and males treated surgically (30%) is based on the experience of too few patients to make the difference statistically reliable. However, this 8% difference represents a 26.7% improvement in survival and, as such, is clinically provocative. Further studies to clarify the status of this finding are recommended. Plans to extend our study to a fifteen-year followup are being made with the expectation that collaboration with other investigators will allow for a larger series of medically treated patients who have been similarly classified.

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1958. Ball, Simon, 255 S. 17th St. (3)
1958. Ballinger, Walter F., II, 1025 Walnut St. (7)
1957. Baltzell, William Hewson, 1530 Locust St. (2)
1940. Barba, Philip S., 120 Erdenheim Road (18)

1943. Barden, Robert P., 8835 Germantown Ave. (18)
1961. Bare, Wesley W., 2400 S. 21st St. (45)
1939. Barnshaw, Harold D., 526 Cooper St., Camden 2, N. J.
1957. Barr, S. Stanley, 255 S. 17th St. (3)
1939. Bartle, Harvey, Jr., Glenbrook Medical Bldg., 864 County Line Rd., Bryn Mawr, Pa.
1963. Bartuska, Doris G., Woman's Medical College (19129)
1963. Bassett, James G., 3300 Henry Ave. (19129)
1932. Batson, Oscar V., 3926 Pine St. (4)
1921. Bauer, Edward L., Alden Park Manor (44)
1933. Bauer, John T., 312 E. Second St., Moorestown, N. J.
1939. Baumann, Frieda, R.D. 2, West Chester, Pa.
1930. Beardwood, Joseph T., Jr., 1201 Ansley Ave. (26)
1952. Bedrossian, E. Howard, 4501 State Rd., Drexel Hill, Pa.
1949. Beecham, Clayton T., 105 West School Lane (44)
1935. Beerman, Herman, 255 S. 17th St. (3)
1942. Behrend, Albert, 1018 Melrose Ave. (26)
1945. Behrend, Bernard, 5910 Greene St. (44)
1934. Behrend, Moses, Rittenhouse Claridge, 18th & Walnut St. (3)
1949. Beizer, Lawrence H., 419 South 19th St. (46)
1930. Belk, William Parks, 433 Owen Rd., Wynnewood, Pa.
1936. Bell, Benjamin Tertius, 1941 Woodland Rd., Abington, Pa.
1956. Beller, Martin Leonard, 1936 Spruce St. (3)
1947. Bellet, Samuel, 2021 Spruce St. (3)
1956. Belmont, Owen, 5723 No. Park Ave. (41)
1959. Berk, Nathaniel G., 2534 W. Cheltenham Ave. (50)
1941. Bernstein, Mitchell, 2053 S. John Russell Circle (17)
1951. Bernstine, J. Bernard, 255 S. 17th St. (3)
1960. Bernstine, Melvin Lewis, 1543 Marmont Lane, Los Angeles 46, Cal.
1956. Berry, Theodore J., 331 E. Lancaster Ave., Wynnewood, Pa.
1957. Biele, Albert M., 1530 Locust St. (2)
1918. Billings, Arthur E., 2020 Spruce St. (3)
1957. Birdsall, Thomas M., 255 S. 17th St. (3)
1949. Bishop, Edward H., 811 Spruce St. (7)
1933. Bishop, Paul A., 1347 Waverly Rd., Gladwyne, Pa.
1944. Blady, John V., Parkway House, 2201 Benjamin Franklin Pkwy. (30)
1960. Blake, Alton D., Jr., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1952. Blake, Paul O., 273 N. Lansdowne Ave., Lansdowne, Pa.
1958. Blakemore, William S., 419 S. 19th St. (46)
1917. Block, Frank B., A1124 Park Drive Manor (44)
1957. Block, Louis H., 1351 Tabor Rd. (41)
1963. Block, Reuben, 1555 Haddon Ave., Camden, N. J.
1949. Blumstein, George I., 2039 Delancey St. (3)
1929. Bockus, Henry L., 250 S. 18th St. (3)
1962. Boggs, Thomas R., Jr., Children's Hospital, 1740 Bainbridge St. (46)
1928. Boles, Russell S., Rittenhouse Plaza, 1901 Walnut St. (3)
1923. Bond, Earl D., Bryn Mawr Court, Bryn Maur, Pa.
1961. Bongiovanni, Alfred M., 1740 Bainbridge St. (46)
1948. Bookhammer, Robert S., 209 Rittenhouse Claridge (3)
1931. Bortz, Edward Le Roy, 2021 W. Girard Ave. (30)
1936. Bostwick, Delazon Swift, 1523 Sweetbriar Rd., Gladwyne, Pa.
1951. Boucot, Katharine R., Woman's Medical College (29)
1947. Bourland, Henry S., 2219 Garret Rd., Drexel Hill, Pa.

1961. Bouzarth, William F., 3300 Henry Ave. (29)
1961. Bove, Frank A., 2301 Pennsylvania Ave. (30)
1954. Bowers, Paul A., 2031 Locust St. (3)
1942. Bowie, Morris A., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1963. Boyer, Randal A., Holy Redeemer Hospital, Meadowbrook, Pa.
1959. Brady, Luther W., 230 N. Broad St. (19102)
1954. Bralow, S. Philip, 3701 N. Broad St. (40)
1942. Branen, William T., Whitby & Cypress Aves., Yeadon, Pa.
1921. Bransfield, John W., 2031 Locust St. (3)
1948. Braun, William, 406 Cooper St., Camden, N. J.
1953. Brav, Solomon S., 5575 N. Park Ave. (41)
1953. Breckenridge, Robert L., Our Lady of Lourdes Hosp., 1600 Haddon Ave., Camden 3, N. J.
1961. Breslow, Irwin H., 419 S. 19th St. (46)
1946. Briscoe, Clarence Conway, 811 Spruce St. (7)
1953. Brobeck, John R., Univ. of Pa. School of Medicine (4)
1958. Brody, Henry, Einstein Medical Center, York & Tabor Rds. (41)
1952. Brody, Morris W., 1930 Chestnut St. (3)
1948. Brogan, Edmund J., 1020 Cedargrove Rd., Wynnewood, Pa.
1953. Brooke, John A., 1431 Spruce St. (2)
1958. Brooks, Frank P., Hospital of the Univ. of Pa. (4)
1936. Brown, Clark E., Lancaster Ave. & City Line Ave. (51)
1932. Brown, Claude P., 1930 Chestnut St. (3)
1963. Browne, Laurence T., Presidential Apts., D126 (19131)
1961. Brunt, Manly Y., 111 N. 49th St. (39)
1939. Brust, Raymond M., 4710 Chester Ave. (43)
1953. Bucher, Robert M., 3401 N. Broad St. (40)
1961. Buerk, Minerva S., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1952. Bumgardner, Heath D., 3701 N. Broad St. (40)
1962. Burgoon, Carroll F., Jr., 804 Pine St. (7)
1940. Burnett, W. Emory, 3401 N. Broad St. (40)
1962. Burney, Leroy E., 3400 N. Broad St. (40)
1954. Burros, Harry M., 419 S. 19th St. (46)
1941. Butler, Miriam, Watersmeet, Glen Mills, Pa.
1957. Butterworth, Thomas, 411 Walnut St., Reading, Pa.
1957. Calhoun, John Alfred, Jr., 214 Elm Ave., Swarthmore, Pa.
1958. Cameron, Charles S., 235 N. 15th St. (2)
1962. Camishion, Rudolph C., 1025 Walnut St. (7)
1952. Campbell, Edward W., Abington Memorial Hospital
1944. Campion, Richard J., Box 136 Springhouse, Ambler, Pa.
1960. Cancelmo, John B., 502 East Marshall St., West Chester, Pa.
1931. Cantarow, Abraham, 1025 Walnut St. (7)
1935. Carey, Lawrence S., 330 S. 9th St. (7)
1931. Cariss, Walter L., 51 N. 39th St. (4)
1930. Carpenter, Chapin, 502 Chestnut Lane, Wayne, Pa.
1959. Carrington, Elsie R., Woman's Medical College (29)
1960. Carroll, Robert T., 1015 Sansom St. (7)
1917. Carson, John B., Newton Square, Pa.
1956. Carty, James Byron, 51 Hampden Rd., Upper Darby, Pa.
1956. Casey, Paul R., 8350 Roosevelt Blvd. (15)
1937. Castallo, Mario A., 1621 Spruce St. (3)
1943. Castigliano, S. Gordon, 853 Mt. Pleasant Rd., Bryn Mawr, Pa.
1949. Caswell, H. Taylor, 3401 N. Broad St. (40)

1954. Catenacci, Alfred J., 1417 S. Broad St. (47)
1954. Cathcart, Richard T., Jefferson Hospital, 1025 Walnut St. (7)
1957. Cattie, Vincent J., The Benson, E. 207A., Jenkintown, Pa.
1950. Chamberlain, Richard H., 3400 Spruce St. (4)
1939. Chamberlin, George W., Reading Hospital, Reading, Pa.
1900. Chance, Burton, 9 Llanalew Road, Haverford, Pa.
1945. Chance, Burton, Jr., 8236 Germantown Ave. (18)
1958. Channick, Bertram J., 3701 N. Broad St. (40)
1954. Charny, Charles W., 2039 Delancey Pl. (3)
1960. Chirico, Anna-Marie, Hosp. of Univ. of Pa. (4)
1947. Chouké, Kehar S., P. O. Box 5447, Kecoughtan Station, Hampton, Va.
1945. Cianfrani, Theodore, 1930 Chestnut St. (3)
1939. Ciccone, Emmet F., 2021 Murray St. (15)
1960. Cinquino, Mario A., 1518 S. Broad St. (46)
1960. Clader, Stanley C., 825-A Glenbrook Ave., Bryn Mawr, Pa.
1951. Clagett, Augustus H., Jr., 1618 N. Broom St., Wilmington 6, Del.
1962. Clark, James E., 1015 Chestnut St. (7)
1951. Clark, John K., 36th & Spruce Sts. (4)
1947. Clark, Thomas Williams, 218 W. Chestnut Hill Ave. (18)
1947. Classen, Charles H., Cushman Rd. and Lancaster Ave., Rosemont, Pa.
1963. Cleveland, Albert F., 615 Morgan Ave., Drexel Hill, Pa.
1958. Closson, Edward W., 2320 S. Broad St. (45)
1910. Cloud, J. Howard, 111 St. Pauls Road, Ardmore, Pa.
1949. Cohen, Louis B., 1320 Arrott St. (24)
1953. Cohen, Robert V., 520 Spring Ave., Elkins Park 17, Pa.
1934. Collins, Leon Howard, Jr., 133 S. 36th St. (4)
1943. Colonna, Paul C., 133 S. 36th St. (4)
1949. Conger, Kyril B., 3401 N. Broad St. (40)
1961. Coon, Juluis M., 1025 Walnut St. (7)
1945. Coonel, Pauline, 47 E. Mt. Pleasant Ave. (19)
1930. Cooper, David A., 1520 Spruce St. (2)
1953. Cooper, Donald R., Woman's Medical College, 3300 Henry Ave. (29)
1960. Cooper, Edward Sawyer, 6710 Lincoln Drive (19)
1947. Coppolino, John F., 1807 S. Broad St. (45)
1952. Corbit, John D., Jr., 3717 Chestnut St. (4)
1959. Cormeny, George F., 3818 Chestnut St. (4)
1941. Cornelius, Chalmers E., 119 Summit Ave., Jenkintown, Pa.
1911. Cornell, Walter S., Board of Public Education, Parkway and 21st St. (3)
1914. Corson, Edward F., 3047 Spring Mill Rd., Plymouth Meeting, Pa.
1946. Costello, Thomas J., 825 Glenbrook Ave., Bryn Mawr, Pa.
1924. Cowan, Alfred, 1930 Chestnut St. (3)
1940. Cowan, Thomas H., 1930 Chestnut St. (3)
1947. Crane, A. Reynolds, Pennsylvania Hospital (7)
1937. Crane, Martin P., 4701 Pine St. (43)
1952. Crellin, J. Antrim, 1930 Chestnut St. (3)
1955. Crist, Walter A., 211 N. 5th St., Camden, N. J.
1963. Crosley, Archer P., Jr., The Presbyterian Hospital (4)
1921. Crossan, Edward T., Buttonwood Hall, Conshohocken, Pa.
1959. Cullen, Milton L., 1321 W. Tabor Rd. (41)
1962. Cunningham, John D., 3400 Spruce St. (4)
1934. Custer, R. Philip, 643 Moreno Road, Narberth, Pa.
1958. D'Alonzo, Walter A., 1647 S. 15th St. (45)

1938. Dannenberg, Arthur M., Sr., 235 S. 15th St. (2)
1959. Dannenberg, Arthur M., Jr., Henry Phipps Institute, Univ. of Pa. (4)
1951. Daugherty, Earl A., 2818 W. Girard Ave. (30)
1953. Davie, John H., 37 S. 20th St. (3)
1947. Davis, C. Nelson, 524 Howe Rd., Merion Station, Pa.
1936. Davis, David M., 960 County Line Rd., Bryn Mawr, Pa. (19010)
1957. Davis, John Evan, Tedwyn Apts., 840 Montgomery Ave., Bryn Mawr, Pa.
1951. Davis, J. Wallace, 135 S. 18th St. (3)
1961. Dawber, Bryan A., Penn Mutual Life Insurance Co. (5)
1963. Day, H. James, Temple University Hospital (19140)
1935. Deaver, J. Montgomery, Lankenau Medical Bldg. (51)
1957. Decker, John Paul, Pennsylvania Hospital (7)
1957. Dees-Porch, Frances, Glendale Road & Chestnut Sts., Upper Darby, Pa.
1947. Dehne, Theodore L., Adams Avenue and Roosevelt Blvd. (24)
1935. Deibert, Irvin Elmer, 538 Cooper St., Camden, N. J.
1958. Deitz, George W. III, 2240 Pine Rd., Huntingdon Valley, Pa.
1955. De Long, Samuel L., 860 Lancaster Ave., Bryn Mawr, Pa.
1952. DeLuca, Charles Q., 255 S. 17th St. (3)
1952. De Orsay, Ralph H., 1241 Lindale Ave., Drexel Hill, Pa.
1951. De Palma, Anthony F., 248 S. 21st St. (3)
1963. Derham, Robert J., McClatchy Bldg., Upper Darby, Pa.
1959. DeTuerk, John J., 1930 Chestnut St. (3)
1928. Dewees, A. Lovett, 307 North Princeton Ave., Swarthmore, Pa.
1959. Dickens, Helen O., P. O. Box 9336 (39)
1958. Dickstein, Benjamin, 6810 Castor (24)
1956. Dietrich, Herbert James, Jr., Hospital of the University of Pennsylvania (4)
1952. Digilio, Victor A., 2200 St. James Place (17)
1963. DiMarino, Anthony J., 735 Delaware St., Paulsboro, N. J.
1960. Dinon, Louis R., 330 S. 9th St. (7)
1920. Doane, Joseph C., 617 W. Hortter St. (19)
1948. Dohan, Francis Curtis, 80 Princeton Road, Cynwyd, Pa.
1954. Donaldson, James B., 1901 Walnut St. (3)
1946. Donnelly, Andrew J., 33rd and Powelton Ave. (4)
1933. Donnelly, Joseph C., 7955 Castor Ave. (15)
1937. Donnelly, Robert T. M., 5205 N. Broad St. (41)
1962. Dorman, Philip J., Fidelity Mutual Life Insurance Co. (1)
1954. Downing, Daniel F., 8864 Norwood Ave. (18)
1952. Drayer, Calvin S., 111 N. 49th St. (39)
1949. Dripps, Robert D., 3400 Spruce St. (4)
1956. Dubin, Isadore N., Woman's Medical College (29)
1944. Dublin, George J., 1930 Chestnut St. (3)
1944. Dugger, John H., Episcopal Hospital (25)
1935. Duncan, Garfield G., 330 S. 9th St. (7)
1953. Dupler, Donald A., 4028 Walnut St. (4)
1942. Durant, Thomas M., 3401 N. Broad St. (40)
1947. Durkin, John Keenan, 49 Woodcroft Rd., Havertown, Pa.
1942. Dyer, W. Wallace, Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1962. D'Zmura, Thomas L., 3401 N. Broad St. (40)
1936. Easby, Mary Hoskins, R. D. 1, Burlington, Vt.
1948. Eaton, Francis H., 4007 Chestnut St. (39)
1937. Edeiken, Joseph, 2130 Delancey Pl. (3)
1944. Eger, Sherman A., 255 S. 17th St. (3)

1944. Ehrich, William E., 540 W. Hortter St. (19)
1956. Eiman, John W., Abington Memorial Hospital, Abington, Pa.
1962. Eisenberg, Samuel W., 3536 N. Broad St. (40)
1959. Eisenhower, James S. D., Jr., 2704 Pacific Ave., Wildwood, N. J.
1958. Eisman, Sylvan H., 3600 Spruce St. (4)
1946. Elfman, Louis Kenneth, 6330 Lebanon Avenue (31)
1959. Elias, Elmer J., 10 Monticello Ave., Trenton, N. J.
1949. Elkinton, J. Russell, Oak Lane, Moylan, Pa.
1961. Elliott, Frank A., 807 Spruce St. (7)
1957. Ellis, Richard A., 255 S. 17th St. (3)
1955. Ellis, Samuel, 541 S. 46th St. (43)
1939. Ellis, Van Mashburn, 1528 Spruce St. (2)
1928. Ellison, Richard T., 8601 Stenton Ave. (18)
1936. Ellson, J. Vernon, Glendale Road & Chestnut St., Upper Darby, Pa.
1937. Elsom, Kendall A., Scott Paper Co. (13)
1932. Engel, Gilson C., Lankenau Medical Bldg. (51)
1945. English, O. Spurgeon, 3401 N. Broad St. (40)
1942. Erb, William H., 133 S. 36th St. (4)
1957. Erdman, William James, II, 3400 Spruce St. (4)
1950. Ersner, Matthew S., 1915 Spruce St. (3)
1957. Etzl, Michael M., 9025 Frankford Ave. (14)
1954. Evans, William W., Box 2, Bryn Mawr, Pa.
1955. Eynon, Harold K., Route 70 at East Gate, Barclay Farm, Haddonfield, N. J.
1946. Farell, David M., 1912 Spruce St. (3)
1903. Farr, Clifford B., Railroad Ave. & County Line Rd., Bryn Mawr, Pa.
1945. Farrar, George Elbert, Jr., 528 Scott Rd., Gladwyne, Pa.
1953. Farrell, Harry L., 1930 Chestnut St. (3)
1930. Farrell, John T., Jr., 255 S. 17th St. (3)
1935. Ferguson, Lewis Kraeer, 419 S. 19th St. (46)
1936. Fetter, Ferdinand, 322 S. 21st St. (3)
1945. Fetter, John S., 842 Worrell Rd., Jenkintown, Pa.
1935. Fetter, Theodore R., 255 S. 17th St. (3)
1924. Fewell, Alexander G., 135 South 18th St. (3)
1952. Fields, Harry, 133 S. 36th St. (4)
1959. Fineberg, Charles, 255 S. 17th St. (3)
1955. Finestone, Albert J., 3701 North Broad St. (40)
1960. Finkbiner, Rodman B., 811 Spruce St. (7)
1943. Finkelstein, Arthur, K. Graduate Hospital (46)
1955. Finkelstein, David, 419 S. 19th St. (46)
1955. Finley, John K., 527 Welsh St., Chester, Pa.
1954. Finn, Joseph L., 8014 Burholme Ave. (11)
1947. First, Arthur, 1714 Spruce St. (3)
1960. First, Howard E., 1714 Spruce St. (3)
1954. Fischer, Carl C., Girard College (21)
1950. Fischer, H. Keith, 100 W. Coulter St. (44)
1962. Fisher, George R., III, 801 Spruce St. (7)
1958. Fisher, Robert M., 118 Airdale Rd., Rosemont, Pa.
1956. Fite, Franklin K., Germantown Hospital (44)
1952. Fitts, William T., Jr., 3400 Spruce St. (4)
1952. Flexner, Louis B., 248 Anatomy-Chemistry Bldg., Univ. of Pa. (4)
1928. Flick, John B., 819 Black Rock Rd., Gladwyne, Pa.
1952. Flinn, Lewis B., 1306 Broom St., Wilmington, Del.

1939. Flippin, Harrison F., Lankenau Hospital (51)
1957. Forman, Simon B., 255 S. 17th St. (3)
1957. Fornwalt, George R., 47 Copley Rd., Upper Darby, Pa.
1954. Forster, H. Walter, Jr., 37 S. 20th St. (3)
1960. Foulger, John H., 601 Rockwood Rd., Wilmington, Del. (2)
1941. Fox, C. Calvin, 1806 Spruce St. (3)
1963. Fox, Eva F., Woman's Medical College (19129)
1963. Frank, Paul E., York Road & Summit Ave., Hatboro, Pa.
1963. Frank, Robert L., 514 Cooper St., Camden 2, N. J.
1957. Frankel, Donald S., 255 S. 17th St. (3)
1959. Frankel, Kalman, 1424 Pepper Rd., Rydal, Pa.
1955. Frayer, William C., 37 S. 20th St. (3)
1941. Frazier, William Doane, 419 Gilpin Rd., Narberth, Pa.
1952. Freed, Herbert, 255 S. 17th St. (3)
1956. Freeman, Joseph T., 8-A Rittenhouse Plaza (3)
1963. Freiman, Henry D., 1500 Hellerman St. (49)
1958. Freiwald, Milton J., 222 S. 19th St. (3)
1964. French, Gordon N., Misericordia Hospital (19143)
1953. Fried, Paul H., 1812 Spruce St. (3)
1955. Friedenberg, Zachary B., 133 S. 36th St. (4)
1951. Friedman, Paul Sigmund, 1422 Chestnut St. (2)
1960. Friedmann, Sidney, 1740 Bainbridge St. (46)
1958. Frisch, Frederick, 888 Glenbrook Ave., Bryn Mawr, Pa.
1937. Fritz, Herbert H., Pennswood Rd., Bryn Mawr, Pa.
1961. Frobese, Alfred S., Abington Memorial Hosp., Abington, Pa.
1953. Fruchter, Joseph M., 220 Benjamin Franklin Parkway, Park Towne, North (30)
1940. Fry, Kenneth E., 1719 Rittenhouse Sq. (3)
1935. Fry, Wilfred Eyles, 1930 Chestnut St. (3)
1963. Furgiuele, Francis P., 5430 Greene St. (19144)
1937. Furlong, Thomas F., Jr., Times Medical Building, Ardmore, Pa.
1964. Galligan, William J., 2909 Garrett Road, Drexel Hill, Pa.
1954. Gambescia, Joseph M., 1422 Race St. (2)
1935. Gammon, George D., V.A. Hospital, Perdido St., New Orleans, La.
1951. Garlichs, Richard W., 216 N. Monoa Road, Havertown, Pa.
1931. Garner, Vaughn C., 447 East Wadsworth St. (19)
1953. Garnet, James D., 807 Spruce St. (7)
1959. Gartland, John J., 269 S. 19th St. (3)
1950. Garvin, Eugene J., 533 S. 46th St. (43)
1952. Gefter, William I., 1900 Rittenhouse Square (3)
1935. Geist, Donald C., 301 E. City Line, Bala-Cynwyd, Pa.
1955. Gelfand, David, 1722 Pine St. (3)
1954. German, George B., 429 Cooper St., Camden, N. J.
1941. Gershon-Cohen, J., 255 S. 17th St. (3)
1959. Gerson, Irvin M., 1561 E. Tulpehocken St. (38)
1955. Gettes, Bernard C., 128 Overhill Rd., Cynwyd, Pa.
1963. Giambalvo, Giacchino P., 818 N. 63rd St. (19151)
1934. Gibbon, John H., Jr., 1025 Walnut St. (7)
1939. Gibson, Glen Gregory, 2031 Locust St. (3)
1944. Gifford, Edward S., Jr., 1913 Spruce St. (3)
1956. Gilbert, Philip D., Cooper Hospital, Camden, N. J.
1947. Giletto, Basil J., 2020 Locust St. (3)
1940. Gill, A. Bruce, 1603 Normandy Drive, Mt. Dora, Fla.

1955. Gill, Robert J., 801 Spruce St. (7)
1922. Gilmour, William R., 6616 Woodland Ave. (42)
1952. Gilpin, Sherman F., Jr., 1023 Beury Building, 3701 N. Broad St. (40)
1963. Gindhart, Floyd D., 1213 Hamilton Avenue, Trenton, N. J.
1949. Ginsburg, Isadore W., 3401 N. Broad St. (40)
1958. Girsh, Leonard S., 3701 N. Broad St. (40)
1954. Gislason, Gerhard J., 245 N. Broad St. (7)
1962. Gold, David A., 5587 N. Park Ave. (41)
1956. Goldberg, Harry, 7913 Rolling Green Rd., Cheltenham, Pa.
1958. Golub, Leib J., 136 S. 16th St. (2)
1963. Goluboff, Bernard, 1800 Delancey Place (19103)
1956. Goracci, Armando F., 2040 Poplar St. (30)
1937. Gordon, William, 5345 Spruce St. (39)
1964. Gottlieb, Harry, 5603 Greene St. (19144)
1956. Gouley, Benjamin, 5577 N. Park Ave. (41)
1957. Grahn, Henry Victor, 5132 Chester Ave. (43)
1926. Grant, Francis Clark, 750 Germantown Pike, Lafayette Hill, Pa.
1940. Greene, Lloyd B., 803 Spruce St. (7)
1952. Greening, Roy R., Dept. of Radiology, Jefferson Hospital (7)
1958. Greenspan, Benjamin, 1319 W. Tabor Rd. (41)
1955. Greenstein, Raphael H., 1710 Pine St. (3)
1941. Groff, Robert A., Univ. of Pa. Hospital (4)
1952. Grotzinger, Paul J., 2121 Valley Rd., Huntingdon Valley, Pa.
1952. Grove, D. Dwight, 230 N. Broad St. (2)
1945. György, Paul, Univ. of Pa. School of Medicine (4)
1935. Hadden, Samuel B., 250 S. 18th St. (3)
1951. Hafkenschiel, Joseph H., Jr., 13 St. Asaph Rd., Bala-Cynwyd, Pa.
1945. Hahn, George A., 255 S. 17th St. (3)
1964. Hall, John H., 3401 N. Broad St. (19140)
1955. Hallahan, John D., 104 W. Front St., Media, Pa.
1951. Hallett, Joseph W., 136 S. 16th St. (2)
1961. Hammett, Van Buren O., 111 N. 49th St. (39)
1959. Hampton, Louis J., 1025 Walnut St. (7)
1954. Hand, B. Marvin, 1801 Pennsylvania Blvd. (3)
1938. Hand, John G., 1724 Pine St. (3)
1964. Hanes, Robert B., 501 Long Lane, Upper Darby
1947. Hanes, William James, 218 E. Beechtree Lane, Wayne, Pa.
1963. Hanhausen, Edward H., 18 West Ave., Wayne, Pa.
1950. Hansen, A. Victor, 910 Centennial Rd., Penn Valley, Pa.
1957. Harasym, Emil L., 5416 North 5th St. (20)
1956. Harbert, Frederick, Jefferson Hospital (7)
1952. Harer, W. Benson, State Rd. & Rogers Ave., Bywood, Pa.
1951. Harkins, Herbert P., 1930 Chestnut St. (3)
1963. Harris, Charles, 5301 Old York Road (41)
1962. Harris, James R., Philadelphia General Hospital (4)
1959. Harris, James S. C., 5401 Wayne Ave. (44)
1948. Harris, T. N., 5112 Woodbine Ave. (31)
1929. Harrison, Francis G., 1900 Spruce St. (3)
1926. Hartmann, Fred I., 1914 Pine St. (3)
1946. Harvey, Edith E., 406 York Rd., Jenkintown, Pa.
1947. Harvey, Rolfe Marsh, 669 Mill Rd., Villanova, Pa.
1961. Harvie, Fred H., 3400 Spruce St. (4)

1935. Haskell, Benjamin F., 1427 Spruce St. (2)
1958. Haupt, George J., Lankenau Medical Bldg. (51)
1960. Hausman, David H., Pennsylvania Hospital, 8th & Spruce Sts. (7)
1947. Havens, Walter Paul, Jr., 139 Cheswold Lane, Haverford, Pa.
1963. Hayes, Merrill B., 710 Madison St., Chester, Pa.
1952. Hayllar, Benjamin L., 803 Spruce St. (7)
1961. Hayward, Malcolm L., 111 N. 49th St. (39)
1961. Heath, Frederick K., Merck, Sharp and Dohme, West Point, Pa.
1957. Hedges, Thomas R., Jr., 330 South 9th St. (7)
1961. Heggestad, Gilman E., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1953. Henny, George C., 3400 N. Broad St. (40)
1944. Herbut, Peter A., Dept. of Pathology, Jefferson Medical College Hospital (7)
1954. Herron, James R., 1486 Haddon Ave., Camden 3, N. J.
1963. Hesch, Joseph A., Misericordia Hospital (19143)
1949. Heyl, W. Meredith, 100 W. Coulter St. (44)
1956. Hildreth, Eugene A., Hospital of the University of Pennsylvania (4)
1961. Hilferty, Daniel J., Jr., Wildman Arms Apts., Lansdowne, Pa.
1952. Hinkson, DeHaven, 329 N. 40th St. (4)
1962. Hinman, E. Harold, 1025 Walnut St. (7)
1924. Hirst, John C., 2d., 1821 Spruce St. (3)
1943. Hitschler, William J., Bethlehem Pike & Summit (18)
1944. Hneleski, Ignatius S., 802 S. 48th St. (43)
1943. Hockaday, Agnes, 316 Shadeland Ave., Drexel Hill, Pa.
1939. Hodes, Philip J., Dept. of Radiology, Jefferson Medical College (7)
1947. Hodges, John H., 1025 Walnut St. (7)
1963. Hoffman, Carl J., 2901 Cottman Ave. (19149)
1959. Hoffman, Francis H., 3401 N. Broad St. (40)
1948. Hoffman, George L., Jr., 133 S. 36th St. (4)
1954. Hollander, George, 3500 Vista St. (36)
1949. Hollander, Joseph L., 36th & Spruce Sts. (4)
1951. Hollis, Charles B., 28 W. School Lane (44)
1952. Holloway, Edward E., 1736 Pine St. (3)
1949. Hopkins, Henry U., Garden Court Plaza, 47th & Pine Sts. (43)
1953. Horan, Charles A., 734 N. 63rd St. (31)
1946. Horan, Gerald W., Marple-Newtown Medical Bldg., Newtown Square, Pa.
1947. Horwitz, Orville, Hospital of the University of Pennsylvania (4)
1950. Houlihan, Carl T., 207 McClatchy Bldg., Upper Darby, Pa.
1944. Housel, Edmund L., 255 S. 17th St. (3)
1928. Houser, Karl Musser, 836 Bryn Mawr Ave., Narberth, Pa.
1958. Howard, John M., 230 N. Broad St. (2)
1948. Howland, Alvin Wilcox, School Lane House (44)
1946. Howson, John Yeatts, 316 Lancaster Ave., Wayne, Pa.
1951. Hubbard, John P., University of Pennsylvania School of Medicine (4)
1947. Huber, John Franklin, Temple University School of Medicine (40)
1937. Hughes, Joseph, 111 N. 49th St. (39)
1939. Hughes, P. Boland, 419 Hillbrook Rd., Bryn Mawr, Pa.
1951. Hundley, J. Warren, 3818 Chestnut St. (4)
1954. Hunsicker, William C., Jr., 255 S. 17th St. (3)
1946. Hunt, William T., Jr., 6 Penn Center Plaza (3)
1921. Hunter, Robert John, 928 N. 63rd St. (31)
1952. Hyman, Harold L., 3401 N. Broad St. (40)
1950. Imbriglia, Joseph E., 329 Shadeland Ave., Drexel Hill, Pa.

1949. Ingraham, Norman R., Jr., Stenton and Whitemarsh Aves. (18)
1957. Isaacson, Howard, Haverford Ave. & Drexel Rd.
1951. Isard, Harold J., Albert Einstein Medical Center, 5th & Reed Sts. (47)
1951. Israel, Harold L., 304 S. 19th St. (3)
1947. Israel, S. Leon, 807 Spruce St. (7)
1947. Jaeger, Rudolph, Jefferson Bldg., 1015 Chestnut St. (7)
1941. Jeffers, William A., 503 Owen Road, Wynnewood, Pa.
1960. Jenson, William K., 330 S. 9th St. (7)
1943. Johnson, Julian, 3400 Spruce St. (4)
1959. Johnson, Robert G., 1015 Walnut St. (7)
1938. Johnson, Thomas A., 135 S. 18th St. (3)
1952. Jonas, Karl C., 2601 Parkway (30)
1963. Jones, Robert E., 111 N. 49th St. (39)
1963. Joseph, Rosaline R., 3401 N. Broad St. (40)
1961. Joyner, Claude R., Jr., 3400 Spruce St. (4)
1957. Kacher, Leon, 2037 Pine St. (3)
1957. Kane, Sydney H., 3458 Cottman Ave. (49)
1948. Kaplan, Louis, 2040 Pine St. (3)
1938. Kasper, Kelvin A., 135 S. 18th St. (3)
1958. Kasser, Max D., 37 S. 20th St. (3)
1945. Katz, G. Henry, 111 N. 49th St. (39)
1958. Katz, Jacob, 136 S. 16th St. (2)
1941. Kauffman, M. Luther, Medical Arts Bldg., Jenkintown, Pa.
1947. Kay, Calvin Frederick, Univ. of Pa. Hospital (4)
1954. Kaye, Robert, Children's Hospital, 1740 Bainbridge St. (46)
1947. Keefer, George Pfahler, 136 S. 16th St. (2)
1963. Keeley, Francis X., 8 S. Haddon Ave., Haddonfield, N. J.
1949. Keiserman, Joseph, 5460 Baltimore Ave. (43)
1959. Keitel, Hans G., 1025 Walnut St. (7)
1932. Kelly, Herbert T., 1900 Spruce St. (3)
1961. Kelly, William E., 111 N. 49th St. (39)
1941. Kennedy, Patrick J., 32 Hampden Rd., Upper Darby, Pa.
1948. Kern, Franklin Moore, 903 Nicholson Rd., Wynnewood, Pa.
1921. Kern, Richard A., Temple University Hospital, 3401 N. Broad St. (40)
1935. Keyes, Baldwin L., 2031 Locust St. (3)
1960. Kimmich, John M., Campbell Company, Camden, N. J.
1936. King, Orville C., 330 S. 9th St. (7)
1952. Kirshner, Jacob J., 1930 Chestnut St. (3)
1960. Kitchell, J. Roderick, 3719 Chestnut St. (4)
1920. Klein, Thomas, 250 S. 18th St. (3)
1952. Kleinbart, Morris, 1922 Pine St. (3)
1954. Kligman, Albert M., 36th & Spruce Sts. (4)
1934. Kline, Oram R., 514 Cooper St., Camden, N. J.
1959. Kline, Oram R., Jr., 524 Cooper St., Camden, N. J.
1948. Klingensmith, Paul O., Med. Science Bldg., Lankenau Hosp. (51)
1958. Klingensmith, Walter C., 3600 Spruce St. (4)
1956. Klinghoffer, June F., Woman's Medical College (29)
1932. Klopp, John W., Gwynedd Valley, Pa.
1960. Knopf, Carl L., 5312 Spruce St. (39)
1960. Knorr, John K., 3rd., Lankenau Medical Bldg. (51)
1959. Knowles, Harry J., 255 S. 17th St. (3)
1945. Kobler, H. B., 658 N. 63rd St. (31)

1959. Koiwai, Eichi Karl, 235 N. 15th St. (2)
1963. Kolbe, Henry W., Philadelphia General Hospital (19104)
1957. Koltes, John A., Jefferson Hospital, 14th Annex, 10th & Sansom Sts. (7)
1936. Konzelmann, Frank Williamson, Shore Memorial Hosp., Somer's Point, N. J.
1949. Koop, C. Everett, 1740 Bainbridge St. (46)
1952. Kornblueh, Igho H., Welsh Rd., & Verree Rd. (15)
1958. Kovach, Coleman W., 2031 Locust St. (3)
1941. Krall, J. Thomas, 85 N. Lansdowne Ave., Lansdowne, Pa.
1948. Kramer, David W., 2007 Pine St. (3)
1954. Krasnoff, Sidney O., Tabor Medical Bldg., York & Tabor Roads (41)
1944. Krauss, Frederick Harold, 136 S. 16th St. (2)
1952. Kravitz, Charles H., 626 Ashbourne Rd., Elkins Park, Pa.
1949. Kressler, Robert J., 330 S. 9th St. (7)
1941. Krewson, William E., 3rd, 1930 Chestnut St. (3)
1914. Krumbhaar, Edward B., P. O. Box 4056 (18)
1947. Kuhlenbeck, Hartwig, Woman's Medical College, 3300 Henry Ave. (29)
1964. Kustrup, John F., 1418 S. Broad St., Trenton, N. J.
1947. La Boccetta, Alfred Charles, Philadelphia General Hospital, 34th St. & Curie Ave. (4)
1952. Lachman, John W., 3401 N. Broad St. (40)
1949. La Clair, Charles H., Jr., 1021 W. Main St., Norristown, Pa.
1963. LaFia, David J., Methodist Hospital Medical Bldg. (19148)
1951. Lame, Edwin L., 51 N. 39th St. (4)
1950. Lamont, Austin, 3400 Spruce St. (4)
1946. Lampe, William T. 4207 Tyson Ave. (35)
1962. Landis, Harry P., Jr., 901 Columbia Ave., Palmyra, N. J.
1963. Lang, Leonard P., 1009 Park Place, Wilmington, Del.
1952. Lang, Warren R., 1012 Walnut St. (7)
1941. Langner, Paul H., Jr., 1208 Edmonds Ave., Drexel Hill, Pa.
1945. Lansbury, John, 3401 N. Broad St. (40)
1926. Laws, George M., 1907 Spruce St. (3)
1936. Leaman, William G., Jr., Mountain-Meadow Farm, Unionville, Pa.
1950. Learner, Norman, 3701 N. Broad St. (40)
1920. Leavitt, Frederic Headley, 1527 Pine St. (2)
1941. Leberman, Paul R., Hospital of the University of Pennsylvania (4)
1957. Lee, Charles Trumbull, Jr., 33 E. Chestnut Hill Ave. (18)
1952. Lehman, J. Stauffer, 230 N. Broad St. (2)
1961. Leibfried, Jane M., 5501 Green St. (44)
1960. Leiter, Samuel S., 1301 Westbury Drive, Overbrook Park (31)
1951. Leivy, Frank E., 255 S. 17th St. (3)
1944. Lell, William A., 333 S. 18th St. (3)
1935. Lemmon, William T., 133 S. 36th St. (4)
1963. Lenahan, Paul J., Walnut Park Plaza Hotel (39)
1943. Leopold, Irving H., 1711 Rittenhouse Sq. (3)
1955. Leopold, Robert L., 269 S. 19th St. (3)
1944. Lettiere, Anthony J., 425 E. State St., Trenton, N. J.
1933. Levering, J. Walter, Abington Memorial Hospital, Abington, Pa.
1959. Levick, Leonard J., 1300 E. Cliveden St. (19)
1958. Levine, Samuel, 7100 N. 19th St. (26)
1958. LeWinn, Edward B., Wyncote, Pa.
1960. Lewis, David H., Philadelphia General Hosp. (4)
1915. Lewis, Fielding O., Providence Road, Media, Pa.
1960. Lewis, George C., Jr., 230 N. Broad St. (2)

1955. Lieberman, George E., 2019 Pine St. (3)
1956. Likoff, William, 249 N. Broad St. (2)
1962. Lilley, George W., 316 W. 9th St., Chester, Pa.
1940. Limberger, William A., 301 S. Church St., West Chester, Pa.
1958. Lin, David Y. P., 2222 S. Broad St. (45)
1938. Lindauer, M. August, 133 S. 36th St. (4)
1956. Lindquist, John N., 422 Sabine Ave., Wynnewood, Pa.
1927. Lindsey, Walter H., 102 Park Drive, Highland Park, Doylestown, Pa.
1936. Lintgen, Charles, 1930 Chestnut St. (3)
1958. Lipschutz, Arthur, 7974 Fayette St. (19)
1959. Lipschutz, Herbert, 255 S. 17th St. (3)
1953. Lipsius, Edward I., 319 S. 16th St. (3)
1959. Little, Ralph B., 111 N. 49th St. (39)
1944. Livezey, Mary M., 133 S. 36th St. (4)
1936. Llewellyn, Thomas H., 910 N. 63rd St. (31)
1907. Lodholz, Edward, The Fairfax, 43rd & Locust Sts. (4)
1963. London, Russell I., 6800 Castor Ave. (49)
1951. Long, Joseph P., 1930 Chestnut St. (3)
1935. Long, William L., 2038 Locust St. (3)
1931. Longaker, Edwin P., 41 E. Montgomery Ave., Ardmore, Pa.
1951. Lorber, Stanley H., 3701 N. Broad St. (40)
1961. Lorry, Ralph W., 1247 E. Luzerne St. (24)
1960. Lovett, B. Frank, 300 Broadway, Camden, N. J.
1963. Lubowitz, Richard M., Benson East Apts., Jenkintown, Pa.
1936. Lucchesi, Pascal Francis, 601 E. Gorgas Lane (19)
1960. Lucine, Albert A., 345 S. 19th St. (3)
1932. Lukens, Francis D. W., Univ. of Pa. Hospital (4)
1939. Luongo, Romeo A., 2054 Locust St. (3)
1947. Lurie, Max B., Henry Phipps Institute, Univ. of Pa. (4)
1951. Luscombe, Herbert A., 136 S. 16th St. (2)
1952. Lutman, Frank C., 100 W. Coulter St. (44)
1919. Lynch, Frank B., Jr., 809 Cambridge Apts., School House Lane (44)
1950. Lynch, J. Edward, 23 E. Wynnewood Rd., Wynnewood, Pa.
1953. Lyons, John W., 255 S. 17th St. (3)
1932. McCahey, James F., Rittenhouse-Claridge, 18th & Walnut Sts. (3)
1958. McClenahan, John L., 39 E. Chestnut Hill Ave. (18)
1935. McClenahan, William U., 33 East Chestnut Hill Ave., Chestnut Hill (18)
1953. McCloskey, Joseph F., Jefferson Hospital. (7)
1955. McClure, Carroll R., 17 S. Church St., W. Chester, Pa.
1957. McConnell, Edward L., Jr., 2342 S. Broad St. (45)
1934. McCouch, Grayson P., Univ. of Pa. School of Medicine (4)
1962. McCracken, Stewart, 3701 N. Broad St. (40)
1938. McCrea, Lowrain E., 1930 Chestnut St. (3)
1958. McCune, Wallace G., 5555 Wissahickon Ave. (44)
1942. McDonald, P. Robb, Lankenau Medical Bldg. (51)
1953. McDonnell, William V., West Jersey Hospital, Camden 4, N. J.
1952. McElroy, Robert C., 133 S. 36th St. (4)
1950. McFadden, William M., 1187 E. Washington Lane (38)
1949. McGavic, John S., 601 Montgomery Ave., Bryn Mawr, Pa.
1945. McGee, Lemuel Clyde, Hercules Powder Company, Wilmington, Del.
1954. McGehee, Edward H., 33 E. Chestnut Hill Ave. (18)
1952. McGlade, Thomas H., 719 Cooper St., Camden, N. J. M

1956. McGrath, Raymond J., 1720 Spruce St. (3)
1962. McGregor, Robert A., The Professional Bldg., Augustine Cut-Off, Wilmington 3, Delaware
1959. McKeown, John J., Jr., 1012 Walnut St. (7)
1933. McLaughlin, James S., 330 S. 9th St. (7)
1924. McMillan, Thomas M., 1901 Walnut St. (3)
1924. McPhedran, F. Maurice, Germantown Hosp., Penn and Chew Sts. (44)
1955. McStravog, Lawrence J., 6910 Market St., Upper Darby, Pa.
1954. MacFadyen, Bruce V., 1819 Pennsylvania Blvd. (3)
1943. MacFarlan, Douglas, 101 Church Rd., Ardmore, Pa.
1932 Macfarlane, Catherine, 136 S. 16th St. (2)
1949. MacNeal, Perry Scott, 330 S. 9th St. (7)
1951. Mac Neish, W. J., 136 S. 16th St. (2)
1955. Macy, Dorothy, Jr., 705 Beechwood Road, Media, Pa.
1957. Madow, Leo, 111 N. 49th St. (39)
1935. Maeder, LeRoy M. A., 1910 Rittenhouse Sq. (3)
1952. Mahoney, J. Francis, 250 S. 18th St. (3)
1959. Mandel, Martin M., 255 S. 17th St. (3)
1942. Manges, Lewis C., Jr., Read Memorial Hospital, Hancock, N. Y.
1954. Manges, Willis E., Methodist Hospital, Broad & Wolf Sts. (48)
1959. Maniglia, Rosario, Holy Spirit Hospital, Camp Hill, Pa.
1949. Manlove, Francis R., 500 Williamson Rd., Gladwynne, Pa.
1936. Mann, Bernard, 2019 Pine St. (3)
1960. Manning, Valentine R., 3336 Aldine St. (36)
1956. Manstein, George, 1351 Tabor Rd. (41)
1961. Mapow, Abraham B., 535 Pine St. (6)
1953. Marbach, A. Herbert, 1307 Tabor Rd. (41)
1948. Marden, Philip Ayer, University Hospital, 36th & Spruce Sts. (4)
1937. Margolies, Alexander, 2507 Chestnut St., Chester, Pa.
1958. Marino, Daniel J., 422 East 22nd St., Chester, Pa.
1950. Mark, George E., Jr., 3401 N. Broad St. (40)
1950. Marshall, E. Wayne, Jr., 1520 Spruce St. (2)
1951. Martin, William L., Hahnemann Hospital (2)
1952. Martucci, Albert A., 5015 Akron St. (24)
1953. Marx, Halvey E., 76 Brennan Drive, Bryn Mawr, Pa.
1953. Massey, Franklin C., 122 Hillside Road, Deepdale, Strafford, Pa.
1939. May, Hans, 255 S. 17th St. (3)
1951. Mayock, Robert L., 3600 Spruce St. (4)
1958. Mays, Ralph Whiteman, 154 W. Tulpehocken St. (44)
1961. Mechanick, Philip, Ford Rd. & Monument Ave. (31)
1952. Mecray, Paul, Jr., 405 Loucroft Ave., Haddonfield, N. J.
1951. Medinger, Frederick G., 1941 Woodland Road, Abington, Pa.
1959. Medoff, Joseph, 5400 Wynnefield Ave. (31)
1955. Melnick, Theodore, 1152 N. 63rd St. (31)
1941. Mendell, Theodore H., 2023 Spruce St. (3)
1951. Mendelssohn, Edwin, 1301 Tabor Rd. (41)
1943. Meranze, David R., 1031 Lakeside Ave. (26)
1954. Mertens-Roesler, Elizabeth, 2910 Woodpipe Lane (29)
1956. Merves, Louis, 1015 Chestnut St. (7)
1955. Mervine, Thomas B., 133 S. 36th St. (4)
1959. Metzger, Harry N., 1815 Pine St. (3)
1964. Meyer, Edward C., Fitzgerald-Mercy Hospital, Darby, Pa.
1955. Meyer, Eugene A., 1438 Mt. Ephraim Ave., Camden, N. J.

1937. Meyer, George Phillip, 108 4th Ave., Haddon Hts., N. J.
1956. Miller, Bernard Joseph, 6013 Greene St. (44)
1935. Miller, Ford A., 4016 Chestnut St. (4)
1939. Miller, Malcolm W., Lankenau Medical Bldg. (51)
1939. Miller, Merle M., 6013 Greene St. (44)
1921. Miller, T. Grier, 133 S. 36th St. (4)
1955. Miller, William H., Fitzgerald Mercy Hospital, Darby, Pa.
1952. Minehart, John R., 4821 Germantown Ave. (44)
1952. Mintz, S. S., 1930 Chestnut St. (3)
1963. Misiikin, Mark M., Univ. of Pa. Hospital (19104)
1937. Missett, Joseph Vincent, Jr., 2031 Locust St. (3)
1950. Mitchell, John McK., Bryn Mawr Hospital, Bryn Mawr, Pa.
1952. Mitchell, Robert McNair, 807 Spruce St. (7)
1959. Mitterling, Robert C., Chestnut St. & Glendale Rd., Upper Darby, Pa.
1932. Moiiler, Roy W., 1806 Spruce St. (3)
1936. Montgomery, Hugh, 119 Glenn Road, Ardmore, Pa.
1936. Montgomery, John B., 1930 Chestnut St. (3)
1932. Montgomery, Thaddeus L., 2031 Locust St. (3)
1935. Moore, John Royal, 3401 N. Broad St. (40)
1947. Moore, Matthew Thibaud, 1813 Delancey Pl. (3)
1958. Moore, Samuel R., Jr., 1600 Arch St. (1)
1958. Morani, Alma D., 3665 Midvale Ave. (29)
1936. Morgan, David R., 218 W. Mt. Carmel Ave., Glenside, Pa.
1944. Morris, Harold H., 429 Montgomery Ave., Haverford, Pa.
1945. Morris, I. Paul, 1939 Cheltenham Ave. (17)
1957. Moyer, David G., 701 W. Main St., Lansdale, Pa.
1959. Moyer, John H., 230 N. Broad St. (2)
1941. Mucklé, Craig Wright, 1806 Garrett Rd., Lansdowne, Pa.
1929. Mudd, Stuart, Department of Bacteriology, Univ. of Pa. School of Medicine (4)
1960. Mulberger, Robert D., 1930 Chestnut St. (3)
1949. Mulholland, Stanford W., % Chas. Harwood Memorial Hospital, Christiansted, St. Croix, Virgin Islands
1934. Mullen, Edward A., 472 Roxborough Ave. (28)
1930. Murphy, Douglas P., 601 S. Bowman Ave., Merion Station, Pa.
1953. Murphy, Edward J., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1958. Murphy, John J., 3600 Spruce St. (4)
1959. Murray, Edwin N., 130 N. Broadway, Camden, N. J.
1955. Murtagh, Frederick, Jr., 3401 N. Broad St. (40)
1951. Myers, David, 3701 N. Broad St. (40)
1955. Nachod, Grace R., 5501 Greene St. (44)
1945. Naide, Meyer, 2034 Spruce St. (3)
1951. Naidoff, David, 3500 Tudor St. (36)
1950. Nardone, Anthony A., 912 S. 49th St. (43)
1959. Neal, Hunter, S., 406 Lankenau Medical Bldg. (51)
1958. Nealon, Thomas F., Jr., 1025 Walnut St. (7)
1948. Neese, Paul H., 17 Derwen Road, Cynwyd, Pa.
1963. Nelson, Arthur D., 3400 N. Broad St. (40)
1936. Nelson, Guy M., 255 S. 17th St. (3)
1943. Nelson, Waldo E., 615 Moreno Rd., Narberth, Pa.
1955. Nemir, Paul, Jr., 419 S. 19th St. (46)
1935. Nicholson, Jesse Thompson, 1740 Bainbridge St. (46)
1960. Nicholson, John W., III, 115 Chestnut St., Moorestown, N. J.

1947. Noone, Ernest L., 4501 Cedar Lane, Drexel Hill, Pa.
1954. Norris, Charles M., 3401 N. Broad St. (40)
1905. Norris, George W., 250 S. 18th St. (3)
1938. Norris, Robert F., 513 Wynnewood Ave., Wynnewood, Pa.
1963. Novack, Paul, 230 N. Broad St. (2)
1957. Oakey, Richard S., Jr., 309 Medical Bldg., Lankenau Hospital (51)
1963. O'Hara, A. Edward, Jefferson Medical College Hospital (19107)
1947. O'Keefe, John J., 255 South 17th St. (3)
1954. Olsen, Axel K., 230 N. Broad St. (2)
1949. O'Neill, James F., 140 Roslyn Ave., Glenside, Pa.
1954. O'Neill, Thomas, J. E., Centennial Bldg., Front St. & Lehigh Ave. (25)
1947. Ornsteen, A. M., 2007 Delancey Pl. (3)
1936. Orr, Theodore E., 3815 Chestnut St. (4)
1958. O'Sullivan, Ward D., Misericordia Hospital (43)
1955. Ottenberg, Donald J., Beury Bldg., 3701 N. Broad St. (40)
1913. Outerbridge, George W., 1927 Spruce St. (3)
1961. Owen, Barbara J., Bryn Mawr Hospital, Bryn Mawr, Pa.
1949. Padis, Nicholas, Lankenau Medical Bldg. (51)
1909. Parish, Benjamin Dores, Cresheim Arms Hotel, Allens Lane & Bryan St. (19)
1963. Parish, Benjamin D., Jr., 1201 Bethlehem Pike, Flourtown, Pa.
1945. Park, Felix Roman, 1980 Utica Sq., Tulsa, Okla.
1940. Parker, Alan P., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1948. Parkhurst, Leonard Woods, 330 S. 9th St. (7)
1952. Paxson, Newlin F., 245 N. Broad St. (7)
1932. Payne, Franklin L., Univ. of Pa. Hospital (4)
1954. Pearce, Alexander E., 1420 Race St. (2)
1958. Pearce, Rowan C., Jr., 514 Cooper St., Camden, N. J.
1943. Pearson, Gerald H. J., Presidential Apts.—Adams House (31)
1954. Pearson, Manuel M., 111 N. 49th St. (39)
1952. Peck, Roy I., 3400 Spruce St. (4)
1960. Peltz, William L., 111 N. 49th St. (39)
1930. Pendergrass, Eugene P., Univ. of Pa. Hospital (4)
1953. Penneys, Raymond, University of Pennsylvania Hospital (4)
1942. Perkins, William Harvey, The Lenox, 13th & Spruce Sts. (7)
1946. Perloff, William Harry, Albert Einstein Medical Center (41)
1953. Persky, Abram H., 1737 Chestnut St. (3)
1940. Pessel, Johannes F., 224 West State St., Trenton, N. J.
1952. Peters, Michael, Fairhill Rd., Hatfield, Pa.
1961. Peterson, Lysle H., University of Pennsylvania (4)
1940. Pettit, Horace, Times Medical Bldg., Ardmore, Pa.
1949. Pettit, Mary DeWitt, 3343 W. Penn St. (29)
1915. Pfeiffer, Damon B., Meadowbrook, Pa.
1946. Pfeiffer, Mildred C. J., 358 Valley Rd., Merion, Pa
1935. Phillips, Arthur W., 3904 Walnut St. (4)
1961. Phillips, William A., Eastern Pennsylvania Psychiatric Institute (29)
1911. Piersol, George Morris, 308 Kent Rd., Wynnewood, Pa.
1948. Pierson, Daniel B., Jr., 740 Beacon Lane, Merion, Pa.
1961. Pike, Anne H., 5603 Greene St. (44)
1957. Pilling, George Platt, IV, 2600 N. Lawrence St. (33)
1933. Pillsbury, Donald M., Univ. of Pa. Hospital (4)
1957. Platt, Ruth M., 441 Lyceum Ave. (28)
1951. Poinsard, Paul J., 2031 Locust St. (3)

1937. Polk, David Stewart, Rosemont, Pa.
1956. Pontarelli, Domenic J., 1037 Great Springs Rd., Rosemont, Pa.
1953. Porreca, George A., 1912 Spruce St. (3)
1932. Porter, Roland De Lance, Abington Medical Bldg., Abington, Pa.
1951. Post, Joseph W., 1930 Chestnut St. (3)
1951. Pote, Harry H., 103 E. Ridley Ave., Ridley Park, Pa.
1958. Potter, H. Phelps, Jr., Woman's Medical College (29)
1951. Pressman, Robert S., 170 W. Olney Ave. (20)
1947. Prickett, John A., Warrington, Bucks County, Pa.
1954. Prince, Leon N., 2025 Spruce St. (3)
1931. Pryor, Charles Allen, 255 S. 17th St. (3)
1952. Pugh, James E., 614 Church Lane, Yeadon, Pa.
1947. Putney, Floyd Johnson, 1712 Locust St. (3)
1958. Rachlin, Lillian, Veterans' Adm. Hosp., Livermore, California
1943. Radbill, Samuel X, 7043 Elmwood Ave. (42)
1953. Radbill, Sidney G., 37 S. 20th St. (3)
1953. Raffensperger, Edward C., 260 St. James Place (6)
1945. Rakoff, Abraham Edward, 269 S. 19th St. (3)
1953. Ralston, Edgar L., 3400 Spruce St. (4)
1931. Ramsey, Frank M., 620 E. Willow Grove Ave. (18)
1953. Ranieri, Tito A., 2320 S. Broad St. (45)
1941. Rankin, Charles A., Ludlow & Heather Rd., Upper Darby, Pa.
1951. Rathmell, Thomas K., 446 Bellevue Ave., Trenton, N. J.
1926. Ravdin, I. S., Univ. of Pa. Hospital (4)
1956. Ravdin, Robert Glenn, 3400 Spruce St. (4)
1959. Raventos, Antolin, 3400 Spruce St. (4)
1962. Raymond, F. Douglas, Jr., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1961. Read, William T., Jr., Cooper Hospital, Camden, N. J.
1954. Reagan, Lindley B., 175 Madison Ave., Mt. Holly, N. J.
1960. Reed, Theodore P., Lankenau Medical Bldg. (51)
1928. Reese, Warren S., 2118 Locust St. (3)
1920. Rehfuss, Martin E., 131 St. George's Rd., Ardmore, Pa.
1921. Reiff, E. Paul, Presidential Apts., Apt. A-610, City Line & Presidential Blvd. (31)
1919. Reimann, Stanley P., 703 W. Phil-Ellena St. (19)
1956. Reishtein, William A., 255 S. 17th St. (3)
1963. Reisinger, Paul B., 855 Berkeley Ave., Trenton, N. J.
1951. Rentschler, Laurence B., 5800 Ridge Ave. (28)
1945. Rhoads, Jonathan E., Univ. of Pa. Hospital (4)
1963. Rial, William Y., 111 Dartmouth Ave., Swarthmore, Pa.
1951. Richardson, Fred Mac D., 160 Carpenter Lane (19)
1919. Richardson, Russell, Shamona Mill, Downington, Pa.
1951. Riegel, Donald, 5110 Chester Ave. (43)
1942. Riggs, Helena E., 150 Hewitt Rd., Wyncote, Pa.
1936. Ritter, Joseph A., 1034 Bryn Mawr Ave., Narberth, Pa.
1932. Robbins, Frederick R., 317 Milbank Rd., Bryn Mawr, Pa.
1952. Robbins, Robert, 3401 N. Broad St. (40)
1960. Robbins, William S., 255 S. 17th St. (3)
1954. Roberts, Brooke, 3400 Spruce St. (4)
1957. Roberts, Joan Mary, 4 W. Mt. Pleasant Ave. (19)
1932. Robertson, Harold F., 2118 Pine St. (3)
1964. Robinson, James H., 5900 Spruce St. (19139)
1938. Roche, Philip Q., Route 1, Conshohocken, Pa.

1961. Rodahl, Kaare, Lankenau Hospital Research (51)
1960. Roeders, Paul H., 330 S. 9th St. (7)
1955. Rogers, Fred B., 3401 N. Broad St. (40)
1951. Ronis, Bernard J., 2106 Spruce St. (3)
1948. Roscoe, Constantine R., 7226 Castor Ave. (24)
1928. Rose, Edward, 426 Owen Rd., Wynnewood, Pa.
1936. Rose, Elizabeth Kirk, 426 Owen Rd., Wynnewood, Pa.
1959. Rose, Isadore, 6000 W. Oxford St. (31)
1952. Rose, S. Brandt, Chestnut Hill Hospital (18)
1946. Rosemond, George Parrott, 3401 N. Broad St. (40)
1960. Rosenow, Edward C., Jr., American College of Physicians, 4200 Pine St. (4)
1948. Rothman, Maurice M., 1727 Spruce St. (3)
1951. Rouse, George P., Jr., 250 South 18 St. (2)
1963. Rovit, Richard L., Jefferson Medical College (7)
1952. Roxby, Bruce S., 5501 Greene St. (44)
1955. Roxby, John B., Jr., 4821 Germantown Ave. (44)
1949. Royster, Henry P., 3400 Spruce St. (4)
1941. Royster, Hubert A., Jr., 888 Glenbrook Ave., Bryn Mawr, Pa.
1956. Rubenstone, Albert I., Veterans Administration Hospital (4)
1959. Rubin, Alan, 255 S. 17th St. (3)
1952. Rubin, I. Edward, 255 S. 17th St. (3)
1933. Rudolphy, Jay Besson, 230 S. 21st St. (3)
1946. Rupp, Charles, 133 S. 36th St. (4)
1947. Rush, Alexander, 330 S. 9th St. (7)
1960. Russell, George W., 430 Greenwood Ave., Wyncote, Pa.
1963. Rutter, William A., Suite 103, 1930 Chestnut St. (19103)
1945. Rynes, Samuel E., 334 S. 21st St. (3)
1963. Ryan, James J., 301 E. City Line, Bala-Cynwyd, Pa.
1952. Sain, Fletcher D., Abington Medical Bldg., York & Keith Rds., Abington, Pa.
1958. Sall, Manuel, 255 S. 17th St. (3)
1952. Salner, Nathan P., 6812 Castor Ave. (24)
1952. Saltzman, Maurice, 2037 Spruce St. (3)
1944. Sampson, David Alan, 726 Braeburn Lane, Penn Valley, Narberth, Pa.
1950. Sarner, Joseph B., 269 S. 19th St. (3)
1949. Saul, Leon J., Highland Ave., Media, Pa.
1908. Sautter, Albert C., 6733 Emlen St. (19)
1954. Savacool, J. Woodrow, 146 W. Tulpehocken St. (44)
1947. Sayen, John J., 3600 Spruce St. (4)
1948. Scarano, Joseph Albert, 1432 S. Broad St. (46)
1917. Schaeffer, J. Parsons, 4634 Spruce St. (39)
1929. Scheffey, Lewis C., 601 Walnut Lane, Haverford, Pa.
1942. Scheie, Harold G., 3400 Spruce St. (4)
1929. Schenck, Harry P., 1235 Wyngate Rd., Wynnewood, Pa.
1945. Schlezinger, Nathan S., 255 S. 17th St. (3)
1961. Schlosser, Woodrow D., 3701 N. Broad St. (40)
1917. Schnabel, Truman G., 1704 Pine St. (3)
1958. Schnabel, Truman G., Jr., Phila. General Hospital (4)
1957. Schnall, Nathan, 2037 Pine St. (3)
1962. Schneider, Henry C., 4801 Penn St. (24)
1955. Schreader, Charles J., 318 W. Godfrey Ave. (20)
1958. Schreck, Kenneth M., Temple University School of Medicine (40)
1952. Schulz, Norbert J., 1901 Walnut St. (3)

1963. Schumacher, L. Richard, 60 E. Court St., Doylestown, Pa.
1950. Schumann, Francis, 8811 Germantown Ave. (18)
1948. Schwarz, Gabriel A., 133 S. 36th St. (4)
1962. Schwarz, Henry P., Philadelphia General Hospital (4)
1955. Schwegman, Cletus W., Hospital of the University of Penna. (4)
1930. Scott, John Porter, Children's Hospital, 1740 Bainbridge St. (46)
1950. Scott, Michael, 3401 N. Broad St. (40)
1940. Scott, T. F. McNair, Children's Hospital, 1740 Bainbridge St. (46)
1952. Seifer, Arthur F., 710 South Main St., Phoenixville, Pa.
1958. Sellers, Alfred M., Hosp. of the Univ. of Pa. (4)
1952. Semisch, Charles W., III, 5329 Rising Sun Ave. (20)
1961. Sencindiver, Paige V., 2301 South Broad St., Suite 101 (19148)
1958. Shafer, Albert H., 1004 E. Cherry Hill Apts., Merchantville 10, N. J.
1960. Shannon, Gerard M., 8118 Bustleton Ave. (15)
1950. Sharp, Reuben L., 719 Cooper St., Camden, N. J.
1963. Sharples, Wynne, 928 Fidelity-Phila. Trust Bldg. (9)
1928. Sharpless, Frederick C., 621 Railroad Ave., Haverford, Pa.
1956. Shaw, Daniel L., Jr., 702 Knox Rd., Villanova, Pa.
1963. Shearburn, Edwin W., 306 Lankenau Medical Bldg. (19151)
1955. Shechter, Fred R., 2461 No. 54th St. (31)
1954. Shelley, Walter B., 36th & Spruce Sts. (4)
1955. Shenkin, Henry A., Episcopal Hospital (25)
1946. Shepherd, Samuel Garfield, 2039 Pine St. (3)
1932. Sheridan, Joyce T., 412 W. Durham St. (19)
1956. Sherson, Jacob S., 131 Channing Ave., Malvern, Pa.
1964. Shimkin, Michael B., Temple University School of Medicine (19140)
1936. Shipman, James Shelby, 514 Cooper St., Camden, N. J.
1958. Shipps, Hammell P., 719 Cooper St., Camden 2, N. J.
1957. Shope, Edward Pierce Lentz, 807 Wilson Bldg., Camden, N. J.
1946. Shoup, George Daniel, 121 W. Walnut Lane (44)
1955. Shubin, Harry, 6601 N. 21st St. (38)
1952. Shuman, Charles R., 3401 N. Broad St. (40)
1949. Sidlick, David M., 255 S. 17th St. (3)
1941. Silcox, Louis E., Lankenau Medical Bldg. (51)
1956. Sillars, Charles H., Abington Memorial Hospital, Abington, Pa.
1963. Silverman, Daniel, 269 South 19th St. (19103)
1955. Silverstein, Alexander, 2114 Pine St. (3)
1961. Simmons, Vaughan P., The Fidelity Mutual Life Insurance Co. (1)
1954. Singmaster, Lawrence, Lankenau Medical Bldg. (51)
1952. Skromak, Stanley J., 5108 Torresdale Ave. (24)
1929. Smith, Austin T., 330 S. 9th St. (7)
1964. Smith, Edgar C., 7100 Marshall Road, Upper Darby, Pa.
1955. Smith, J. Winslow, 3034 Darby Rd., Ardmore, Pa.
1933. Smith, Lauren Howe, 111 N. 49th St. (39)
1952. Smith, Richard T., 330 S. 9th St. (7)
1927. Smyth, Calvin Mason, Abington Memorial Hospital, Abington, Pa.
1951. Snape, William J., 573 Stevens St., Camden, N. J.
1938. Snodgrass, L. E., Barclay Hotel, 18th & Rittenhouse Sq. (3)
1953. Snyder, G. Gordon, Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1958. Sodeman, William A., 1025 Walnut St. (7)
1961. Soffe, Alvin M., 1930 Chestnut St. (3)
1935. Sokoloff, Martin J., 255 S. 17th St. (3)

1951. Solis-Cohen, Leon, 1530 Locust St. (2)
1964. Soll, David B., 4831 Leiper St. (19124)
1940. Soloff, Louis A., 3401 N. Broad St. (40)
1950. Somerville, William J., 37 S. 20th St. (3)
1944. Sommer, George N. J., Jr., 120 W. State St., Trenton, N. J.
1952. Sones, Maurice, Mt. Airy Medical Bldg. (19)
1951. Sonneborn, Duane G., 1200 W. Erie Ave. (24)
1928. Spaeth, Edmund B., 1930 Chestnut St. (3)
1958. Spaeth, Philip G., 1930 Chestnut St. (3)
1937. Spangler, John Luther, Devon, Pa.
1957. Spelman, Joseph Worcester, Dept. of Public Health, 13th & Wood Sts. (7)
1935. Spiegel, Ernest A., 6807 Lawnton Ave. (26)
1961. Spiegelman, Jay, Benson East Apt., Jenkintown, Pa.
1955. Spitz, Eugene B., 40–50 W. Front St., Media, Pa.
1958. Splendido, Joseph A., 608 W. Clivedon (19)
1961. Stahlgren, LeRoy H., 419 South 19th St. (46)
1960. Stainback, William C., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1957. Stanley, Robert C. G., 2315 Edgemont Rd., Chester, Pa.
1927. Starr, Isaac, 505 Cresheim Valley Rd. (18)
1952. Stauffer, Herbert M., 3401 N. Broad St. (40)
1952. Stayman, Joseph W., Jr., 8815 Germantown Ave. (18)
1945. Stecher, H. Armin, 1510 Darby Rd., Havertown, Pa.
1955. Steel, Howard H., 3401 N. Broad St. (40)
1952. Steiger, William A., 3401 N. Broad St. (40)
1964. Stein, Donald B., Jr., Fitzgerald-Mercy Hospital, Darby, Pa.
1946. Stein, Irvin, 1936 Spruce St. (3)
1953. Stein, Raymond O., 269 S. 19th St. (3)
1963. Steinberg, Stanley B., 2461 N. 54th St. (19131)
1936. Steinfield, Edward, 2200 Benjamin Franklin Parkway (30)
1951. Sterling, Julian A., 1008 Sharpless Rd. (26)
1948. Stevens, Lloyd W., 133 S. 36th St. (4)
1928. Stokes, Joseph, Jr., Children's Hospital, 1740 Bainbridge St. (46)
1943. Stokes, S. Emlen, 129 Chester Ave., Moorestown, N. J.
1954. Stone, Hrant H., E. Shawmont Ave. (28)
1952. Stoner, Emery K., 222 E. Mt. Pleasant Ave. (19)
1961. Strang, John E., 330 S. 9th St. (7)
1953. Strawbridge, Rendall R., Lankenau Medical Bldg. (51)
1937. Strumia, Max M., Penn Valley, Narberth, Pa.
1960. Strumia, Paul V., Bryn Mawr Hospital, Bryn Mawr, Pa.
1927. Sturgis, Samuel Booth, 349 Wistar Rd., Wynnewood, Pa.
1961. Sullivan, Andrew A., 5455 Trinity Place (43)
1930. Sunderman, F. William, 1833 Delancey Place (3)
1961. Sunderman, F. William, Jr., 1025 Walnut St. (7)
1954. Sussman, Marcel S., 101 S. 20th St. (3)
1963. Sutliff, Frederick P., 3701 N. Broad St. (19140)
1952. Sweeney, Francis X., 2412 E. Allegheny Ave. (34)
1952. Talbot, Timothy R., Jr., 204 Booth Lane, Haverford, Pa.
1943. Tassman, Isaac S., 136 S. 16th St. (2)
1963. Tassman, William S., 712 Medical Arts Bldg. (2)
1946. Tauber, Robert, 2019 Walnut St. (3)
1952. Taylor, Ann Gray, 6364 Germantown Ave. (44)
1960. Taylor, Daniel B., 2241 Federal St. (46)

1956. Templeton, John Y., III, 255 S. 17th St. (3)
1951. Theodos, Peter A., 1930 Chestnut St. (3)
1961. Therman, Per-Olof, 111 N. 49th St. (39)
1959. Thomas, Arthur H., 5240 Vine St. (39)
1946. Thomas, Carmen C., 1930 Chestnut St. (3)
1964. Thomas, John W., 5900 Spruce St. (19139)
1952. Thompson, Charles M., 255 S. 17th St. (3)
1927. Thorington, J. Monroe, Cambridge Apts., Wissahickon Ave. & School House Lane (44)
1936. Thudium, William J., 700 Merion Square Rd., Gladwyne, Pa.
1954. Tindall, Dorothy D , 1930 Rittenhouse Sq. (3)
1935. Toland, Owen J., 336 Aubrey Rd., Wynnewood, Pa.
1952. Tondreau, Roderick L., 6470 Drexel Rd. (31)
1949. Tornay, Anthony S., 2038 Locust St. (3)
1945. Tourish, William J., 1124 Woodmont Rd., Gladwyne, Pa.
1936. Towson, Charles Emory, 224 W. Washington Lane (44)
1955. Trimpi, Howard D., 501 N. 17th St., Allentown, Pa.
1954. Trommer, Philip R., 258 S. 18th St. (3)
1956. Troncelliti, Mario V., Pennsylvania Hospital (7)
1953. Tropea, Frank, Jr., 500 Mulberry Lane, Haverford, Pa.
1947. Trueman, Robert H., 2101 Chestnut St. (3)
1954. Truitt, R. Marshall, Jr., 740 Westview St. (19)
1959. Tuddenham, William J., Pennsylvania Hospital (7)
1938. Tuft, Louis, 1530 Locust St. (2)
1933. Tumen, Henry J., 1830 Rittenhouse Square (3)
1938. Turman, Christopher M., 1531 Amity Rd., Rydal, Pa.
1923. Turner, Creighton, H., 1731 Pine St. (3)
1954. Turner, Linton W., 3401 N. Broad St. (40)
1959. Tyson, R. Robert, 3401 N. Broad St. (40)
1937. Uhle, Charles A. W., Lankenau Medical Bldg. (51)
1953. Ulin, Alexander, W., 230 N. Broad St. (2)
1907. Ullom, Josephus T., Carpenter and Quincy Sts. (19)
1960. Uricchio, Joseph F., 245 N. Broad St. (7)
1950. Valdes-Dapena, Antonio, 214 Plush Mill Rd., Wallingford, Pa.
1958. Van den Noort, Gordon S., 888 Glenbrook Ave., Bryn Mawr, Pa.
1937. Vander Veer, Joseph B., 330 S. 9th St. (7)
1937. Van Loon, Emily Lois, 255 S. 17th St. (3)
1960. Van Meter, Ralph H., 244 W. Main St., Moorestown, N. J.
1933. Vastine, Jacob H., 2nd, 267 Kent Rd., Wynnewood, Pa.
1963. Vaughn, Arthur R., Jr., 512 W. Erie Ave. (19140)
1958. Velkoff, Cyril L., 2100 Walnut St. (3)
1955. Viek, Peter, 1941 Woodland Rd., Abington, Pa.
1952. Vischer, Thomas J., 5903 Greene St. (44)
1940. Voegelin, Adrian W., Germantown Professional Bldg. (44)
1941. Vogel, Stoughton R., 151 W. Tulpehocken St. (44)
1960. Wagenheim, Harry H., 1822 Spruce St. (3)
1949. Wagner, Frederick B., Jr., 800 Chauncy Road, Narberth, Pa.
1949. Wagner, Joseph A., 201 Highland Ave., Bryn Mawr, Pa.
1954. Wainer, Amos S., 1621 Spruce St. (2)
1938. Waldman, Joseph, 404 Meadowbrook Lane (18)
1955. Waldron, Jerome M., 2300 Cheltenham Ave. (50)
1932. Walkling, Adolph A., 136 S. 16th St. (2)
1955. Warner, Halsey F., 100 W. Coulter St. (44)

1956. Watkins, E. Lloyd, 8811 Germantown Ave. (18)
1954. Waugh, Elizabeth S., 348 Greene Lane (28)
1952. Weaver, Harry S., Jr., 37 S. 20th St. (3)
1955. Weaver, Robert L., 26 Henley Rd. (31)
1953. Weber, Lennard L., 255 S. 17th St. (3)
1930. Weeder, S. Dana, The Stafford House, Chelten & Wissahickon Aves. (44)
1954. Weiner, Louis H., Carlene Apts., 2500 Belmont Ave. (31)
1952. Weinstein, George L., 255 S. 17th St. (3)
1950. Weiss, Sidney, 2037 Locust St. (3)
1959. Wellenbach, Burton L., 255 S. 17th St. (3)
1951. Welty, Jack W., Montgomery Ave. & Owen Rd., Wynnewood, Pa.
1955. Wendkos, Martin H., Latches Lane Apts., Merion, Pa.
1962. Wentz, Clarkson, 20 S. Valley Road, Paoli, Pa.
1961. Wermuth, William C., 111 N. 49th St. (39)
1959. West, Clifton F., Jr., 406 Lankenau Medical Bldg. (51)
1935. Whelan, G. L., 2014 Delancey Place (3)
1921. Whitaker, William, 4645 Oakland St. (24)
1936. White, Ellen Pawling Corson-, Gladwyne, Pa.
1960. Whiteley, William H., 1015 Chestnut St. (7)
1925. Widmann, Bernard P., 250 S. 18th St. (3)
1954. Wieder, Henry S., Jr., 330 S. 9th St. (7)
1939. Willauer, George, 6129 Greene St. (44)
1937. Williams, John C., 6370 Germantown Ave. (44)
1920. Williams, Philip F., 256 Broughton Lane, Villanova, Pa.
1950. Williams, R. G., Univ. of Pa. School of Medicine (4)
1927. Williamson, Ernest G., 6353 Woodbine Ave. (31)
1949. Willson, J. Robert, 3401 N. Broad St. (40)
1945. Wilson, John F., 2013 Delancey Pl. (3)
1937. Wilson, Ross B., Lankenau Medical Bldg. (51)
1949. Wilson, William W., 133 S. 36th St. (4)
1957. Winkelman, N. William, Jr., 4141 Apalogen Rd. (44)
1963. Winston, Joseph M., Jeanes Hospital (11)
1948. Winston, Julius, 5839 Chester Ave. (43)
1941. Wirts, C. Wilmer, 2017 Delancey St. (3)
1961. Wise, Robert I., 1025 Walnut St. (7)
1953. Wohl, George T., Philadelphia General Hospital (4)
1933. Wohl, Michael G., 1727 Pine St. (3)
1958. Woldow, Irving, Einstein Med. Center, York & Tabor Rds. (41)
1958. Wolf, John H., 124 W. Walnut Lane (44)
1944. Wolf, Lewis R., 3474 Frankford Ave. (34)
1918. Wolferth, Charles C., 133 S. 36th St. (4)
1962. Wolferth, Charles C., Jr., 230 N. Broad St. (2)
1957. Wolgamot, John R., 244 W. Main St., Moorestown, N. J.
1957. Wolkowicz, Michael I., 2022 Spruce St. (3)
1942. Wolman, Irving J., 7607 Woodlawn Ave. (26)
1932. Wood, Francis C., 212 Laurel Lane, Haverford, Pa.
1944. Wood, H. Curtis, Jr., 7010 Lafayette Ave., Fort Washington, Pa.
1953. Woodruff, Marston T., 4940 Penn St. (24)
1928. Wright, Carroll S., 1402 Spruce St. (2)
1960. Wurzel, Harold A., 3400 Spruce St. (4)
1941. Young, Barton R., Germantown Hospital (44).
1961. Zanni, Anthony L., 111 N. 49th St. (39)

1957. Zaslow, Jerry, 1351 Tabor Rd. (41)
1955. Zatuchni, Jacob, 3401 N. Broad St. (40)
1946. Zeigerman, Joseph H., 2105 Spruce St. (3)
1949. Zintl, William J., 69th & Market Sts., Upper Darby, Pa.
1956. Ziserman, Abraham J., 2046 Pine St. (3)
1962. Zubrow, Sidney N., 521 Pine St. (6)
1933. Zulick, J. Donald, Abington Memorial Hospital, Abington, Pa.

Non-Resident Fellows

ELECTED

1936. Alexander, Fay K., Lincolnville, Maine
1941. *Aronson, Ronald S., 9401 Byeforde Road, Kensington, Md.
1954. Austin, George M., University of Oregon Medical School, Portland, Oregon.
1942. Bachman, Carl, Rutherford, Napa Co., Calif.
1931. Bates, William, Harrisburg Hospital, Harrisburg, Pa.
1955. Beckfield, William J., Luther Hospital, 310 Chestnut St., Eau Claire, Wisconsin.
1932. Behney, Charles A., P. O. Box 4256, San Jose Branch, Bisbee, Arizona
1955. Blank, Harvey, Jackson Memorial Hospital, Miami 36, Fla.
1921. Borzell, Francis F., R. D. 2, Box 2051, Browns Mills, N. J.
1937. Braceland, Francis J., The Institute of Living, 200 Retreat Ave., Hartford, Conn.
1951. Brinton, S. Jervis, Box 3, Avalon, N. J.
1948. *Brown, Robert B., U. S. Naval Hospital, Bethesda, Md.
1959. Browneller, Ellsworth R., Geisinger Medical Center, Danville, Pa.
1953. Burbidge, J. Raymond, 163 Nassau St., Princeton, N. J.
1948. Chapman, John P., Calle Fray Junipero Serra 26, Palma de Mallorca, Balearic Islands, Spain.
1950. Chapple, Charles, C., 2612 Naylor Rd., S.E., Washington 20020, D. C.
1941. Cheleden, John, 1012 Volusia Ave., Daytona Beach, Fla.
1930. Clarke, Francis Mann, 116 New St., New Brunswick, N. J.
1926. Clerf, Louis H., 5575-8th Ave., North St. Petersburg, Fla.
1930. Cottrell, James E., 27 Shinnecock Trail, Medford Lakes, N. J.
1959. * Cowan, Capt. John S., U. S. Naval Hospital, San Diego, Calif.
1960. Cowley, Allen W., Sr., 1919 N. Front St., Harrisburg, Pa.
1947. Cutler, Norman L., 1300 Harrison St., Wilmington, Del.
1941. *Cuttle, Tracy D., Portsmouth Naval Shipyard, Portsmouth, N. H.
1955. Daugherty, J. Arthur, 1511 N. Front St., Harrisburg, Pa.
1937. Davis, Perk Lee, Turkey Hollow, R.D. 5, Waynesburg, Pa.
1954. Deitrick, John E., Cornell Univ. Medical College, 1300 York Ave., New York 21, N. Y.
1941. Dixon, Harold M., 4805 46th St., N.W., Washington 16, D. C.
1953. Dixon, James P., Antioch College, Yellow Springs, Ohio.
1961. Duane, Thomas D., 35 E. Elizabeth Ave., Bethlehem, Pa.
1959. Durgin, Bernice Elise, 221 N. Allegheny St., Bellefont, Pa.
1955. Edwards, Margaret Hay, 800 4th St., S.W., Washington 24, D. C.
1953. Eisenberg, Isadore J., 2806 Green St., Harrisburg, Pa.
1951. Ellis, Mackinnon, 121 Mill Rock Rd., Hamden, Conn.
1957. *Errion, Arthur Robbins, U. S. Naval Hospital, St. Albans, L. I., N. Y.
1951. Ervin, Carl E., 240 North Third Street, Harrisburg, Pa.
1944. Estes, W. L., Jr., 35 E. Elizabeth Ave., Bethlehem, Pa.
1954. Evans, Harry D., Jr., American Cyanamid Co., 1 Caspar St., Danbury, Conn.

* Military service.

1952. Faller, Constantine P., 127 State St., Harrisburg, Pa.
1940. Forrester, James S., Harrisburg Polyclinic Hospital, Harrisburg, Pa.
1951. Friedland, Carl K., 271 W. Blackwell St., Dover, N. J.
1947. Gaskill, Herbert S., 9648 E. Powers Drive, Englewood, Colo.
1913. Gates, Nathaniel, 10 Peterboro Ave., Detroit, Mich.
1958. Geckeler, George D., Tranquility, S. Windham, Vt.
1957. Giering, John Fleming, 84 James St., Kingston, Pa.
1931. Gilman, Robert Louis, Cheyney, Pa.
1954. Godfrey, Ellwood W., Princeton Hospital, Princeton, N. J.
1928. Gordon, Burgess L., 1550 Lake Shore Dr., Chicago, Illinois
1952. Grieco, Reynold M., 2 W. 4th St., Williamsport, Pa.
1934. Griffith, John Q., Jr., 6 North Fredericksburg Ave., Margate, N. J.
1952. Gross, Elmer R., Medical Arts Bldg., Wilmington, Del.
1933. Gruber, Charles M., 1313 College Ave., Redlands, Calif.
1935. Haines, Harlan F., 231 N. Pine St., Seaford, Del.
1939. Hamblock, Leonard C., R.D. 2, Mt. Joy, Pa.
1955. Harris, John H., 1301-A N. Second St., Harrisburg, Pa.
1932. Harris, Stanley E., 229 Maple Ave., Delanco, N. J.
1936. Hatch, Lerleen Clement, 2184 Ayres Ave., Akron, Ohio.
1947. Hawthorne, Herbert R., 1016 Yardley Rd., Morrisville, Pa.
1928. Hayman, Joseph M., Jr., Tufts University Medical School, Boston, Mass.
1946. Hendrickson, Frank O., Jupiter, Fla.
1944. Hershey, J. Ivan, VA Hospital, Shreveport, La.
1955. Hills, Arthur G., 1000 N. W. 17th St., Miami, Fla. (36)
1933. Hitzrot, Lewis H., Medical Director, Mercersburg Academy, Mercersburg, Pa.
1950. Horn, Robert C., Henry Ford Hospital, Detroit, Mich.
1953. Imber, Irving, 428 Walnut St., Reading, Pa.
1958. Impink, Robert R., 405 Oley St., Reading, Pa.
1935. Ingleby, Helen, The Church House, Heacham, King's Lynn, England.
1921. Ivy, Robert H., 104 Dalton Rd., Paoli, Pa.
1952. Jones, Ralph, Jr., Jackson Memorial Hospital, Miami, Fla.
1955. Jordan, Charlotte B., 175 E. Brown St., E. Stroudsburg, Pa.
1955. Jordan, Claus G., 175 E. Brown St., E. Stroudsburg, Pa.
1936. Kain, Thomas M., 30 Northeast 97th St., Miami, Fla.
1956. Keffer, William H., 413 Oley St., Reading, Pa.
1947. Kelchner, Clyde H., 1125 Turner St., Allentown, Pa.
1944. LaMotte, William O., Brook Hill Farms, Hockessin, Del.
1954. LaMotte, William O., Jr., Professional Bldg., Wilmington 3, Del.
1952. Levan, John B., 401 Oley St., Reading, Pa.
1949. Lhamon, William T., Baylor University College of Medicine, Houston, Texas
1954. Light, John J. B., 25 N. 9th St., Lebanon, Pa.
1954. Lindenmuth, Woodrow W., VA Hospital, West Haven, Conn.
1948. Livingood, Clarence S., Henry Ford Hospital, Detroit 2, Mich.
1933. Long, Esmond R., Conifer, Pedlar Mills, Va.
1948. McLaughlin, John T., 1252 S. Central Ave., Glendale, Calif.
1950. Mackmull, Gulden, 174 Nob Hill Lane, Ventura, California.
1953. Margolies, Michael, 567 E. Chestnut St., Coatesville, Pa.
1955. Margolies, M. Price, 379 E. Chestnut St., Coatesville, Pa.
1935. Mason, James B., P. O. Box 373, Gig Harbor, Washington
1932. Meade, Richard H., Jr., 750 San Jose Dr., Grand Rapids, Mich.
1936. Middleton, William Shainline, Veterans Administration, Washington, D. C.

1946. Miller, Franklin R., Snyder-Jones Clinic, First Nat. Bk. Bldg., Winfield, Kansas
1928. Moon, Virgil H., Univ. of Miami, Coral Gables, Fla.
1949. Motley, Hurley L., 1212 Shatto S., Los Angeles, Calif.
1937. Nicholson, Samuel T., 2d, 642 High St., Pottstown, Pa.
1960. Ojers, Gaylord W., 35 E. Elizabeth Ave., Bethlehem, Pa.
1956. Oppenheimer, Albert, 224 E. Main St., Moorestown, N. J.
1926. Paul, John Rodman, Dept. Preventive Medicine, Yale University, New Haven, Conn.
1959. Pendergrass, Henry P., Massachusetts General Hospital, Boston, Mass.
1950. Pincus, Irwin J., Cedars of Lebanon Hospital, Los Angeles, Calif.
1938. Read, Hilton S., 5407 Atlantic Ave., Atlantic City, N. J.
1964. Reed, Miriam, 253 Witherspoon St., Princeton, N. J.
1958. Reinhardt, David J., III, 1303 Delaware Ave., Wilmington, Del.
1936. Reisinger, John A., 1835 Eye St., N.W., Washington, D. C.
1955. Rettew, Philip L., 612 Museum Rd., Reading, Pa.
1961. Richardson, Herschel E., 205 Mayerline St., Houston, Texas
1947. Rogers, Arthur Merriam, 1351 Durwood Drive, Charlotte, N. C.
1907. Royer, B. Franklin, 429 E. Baltimore St., Greencastle, Pa.
1954. Sampson, Martin C., Wallace Laboratories, Cranbury, N. J.
1936. Sands, Joseph Evans, 135 107th St., Stone Harbor, N. J.
1945. Schell, James F., 506 Sharpley Lane, Wilmington, Del.
1921. Schumann, Edward A., 4141 Jackson Drive, Lafayette Hill, Pa.
1951. Seitchik, Joseph, Sinai Hospital of Baltimore, Baltimore, Md.
1941. Shands, Alfred R., Jr., Alfred I. duPont Institute, Rockland Rd., Wilmington, Del.
1908. Shannon, Charles E. G., 9 Park St., Waterville, Maine.
1950. Shiffer, Paul H., Dreher Ave., R.D. #2, Stroudsburg, Pa.
1951. Shorey, Winston K., 46 Wingate Drive, Little Rock, Ark.
1933. Smelzer, Donald C., Lancaster General Hospital, Lancaster, Pa.
1954. Smith, Charles W., 128 State St., Harrisburg, Pa.
1929. Sponsler, Marshall B., 103 Lansdowne Road, DeWitt, N. Y.
1953. Steele, Brandt F., 717 Pontiac St., Denver 20, Colo.
1942. Stengel, Alfred, Jr., 75 Highland St., Holden, Mass.
1955. Stevenson, Theodore D., Presbyterian Board of Foreign Missions, 156 Fifth Ave., New York 10, N. Y.
1934. Stewart, Sloan G., 6200 Atlantic Ave., Ventnor, N. J.
1931. Stiles, Merritt H., E. 406 14th Ave., Spokane 3, Wash.
1953. Stroud, Morris W., 3rd, Harvard Rd., Cleveland, Ohio.
1934. Summey, Thomas J., Morrowdale Farm, Rt. 2, Charlottesville, Va.
1931. Taylor, Norman H., Queen of the East, E. Broadway, Hamilton, Bermuda.
1928. Thomas, J. Earl, Loma Linda University, Loma Linda, Calif.
1961. Thompson, James C., Harbor General Hospital, 1000 W. Carson St., Torrance, California
1942. Thompson, Wesley D., 247 E. 3rd St., Lewistown, Pa.
1941. Tompkins, Pendleton, 490 Post St., San Francisco, Calif.
1959. Toole, James F., Bowman Gray School of Medicine, Winston Salem, N. C.
1897. Veasey, Clarence A., 1118 W. 9th Ave., Spokane 9, Wash.
1933. Waygood, James L., Pocono Pines, Pa.
1941. Weaver, Ruth H., 108 Atlantic Ave., Atlantic City, N. J.
1959. Whayne, Tom F., University of Kentucky Medical Center, Lexington, Ky.
1936. Wilder, Theodore S., Beckley Memorial Hospital, Beckley, W. Va.
1935. Willard, John H., Harlan Memorial Hospital, Harlan, Kentucky.
1963. Wood, Horatio C., IV, Cincinnati General Hospital, Cincinnati, Ohio.
1953. Zarafonetis, Chris J. D., Simpson Memorial Institute, University of Michigan, Ann Arbor Michigan

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1959. FAY, MARION, B.A., M.A., PH.D., SC.D.(HON.), LL.D.(HON.), Woman's Medical College, Henry Ave. & Abbottsford Rd. (29)

1936. RICHARDS, ALFRED NEWTON, PH.D., SC.D.(HON.), M.D.(HON.), LL.D.(HON.), Emeritus Professor of Pharmacology, School of Medicine, and Associate Trustee, University of Pennsylvania. (4)

1958. SHRYOCK, RICHARD H., PH.D., American Philosophical Society, Independence Square (6)

1947. STONE, ROBERT SPENCER, M.D., University of California Medical School, San Francisco, Cal.

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1937. DALE, SIR HENRY HALLET, C.B.E., F.R.S., M.A., M.D., F.R.C.P., 52 Queen Anne St., London, W. 1, England.

1955. MANN, IDA, M.A., D.SC., M.B., B.S., L.R.C.P., D.O.M.S., F.R.C.S., Ophthalmic Consultant to the Government of W. Australia, 56 Hobbs St., Nedlands, Perth, W. Australia.

1962. SCHWEITZER, ALBERT, PH.D., TH.D., M.D., D.D.(HON.), MUS.D.(HON.), LL.D.(HON.), O.M., Lambaréné Hospital, Lambaréné, Gabon Republic, W. Africa.

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1955. CLEMENT, MARTIN W., 6 Penn Center Plaza (4)

1955. DIEMAND, JOHN A., President, Insurance Company of North America, 1600 Arch St. (2)

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Resident Fellows	*Date of Election*	*Date of Death*
ALLEN, FREDERICK H.	May 9, 1932	January 15, 1964
BOTHE, FREDERICK A.	January 9, 1928	March 21, 1963
CAMPBELL, EDWARD H.	January 9, 1928	December 27, 1963
CARDONE, JOHN B.	February 6, 1952	November 16, 1963
CARNWATH, JOHN W.	April 4, 1956	January 12, 1964
CLARK, ELIOT R.	May 6, 1929	November 1, 1963
CRUMP, JEAN	May 10, 1937	April 13, 1963
FITZ-HUGH, THOMAS JR.	January 9, 1928	September 26, 1963
GOLD, PAUL A.	December 5, 1962	June 15, 1963
KIRBY, CHARLES K.	March 5, 1958	January 20, 1964
LISKER, SAMUEL	Janurary 10, 1945	January 29, 1964
MILLER, M. VALENTINE	May 9, 1932	November 17, 1963
RAPOPORT, MILTON	April 3, 1946	May 2, 1963
ROBERTS, ELLA	October 4, 1939	October 21, 1963
SCHOFIELD, FREDERICK S.	January 9, 1928	April 9, 1963
SHAY, HARRY	April 7, 1948	July 30, 1963
THORP, FRANCIS Q.	January 6, 1936	December 20, 1963
TOCANTINS, LEANDRO M.	May 6, 1935	March 22, 1963
YANOFF, JACOB	February 3, 1960	January 5, 1964
Non-Resident Fellows	*Date of Election*	*Date of Death*
ADDISON, WILLIAM H. F.	November 6, 1912	February 24, 1963
CROWE, ALDRICH C.	January 8, 1940	April 2, 1961
MCCALL, MILTON L.	January 7, 1948	October 8, 1963

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1964

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